MELSEC ST Series

Modular Input/Output System

Installation Manual

Head Station
Power Feeding Modules
Digital I/O-Modules
Analog I/O-Modules

Art.no.: 163534
21042005
Version A

About this Manual

The texts, illustrations, diagrams, and examples contained in this manual are intended exclusively as support material for the explanation, handling and operation of the componenets of the MELSEC ST Series.

If you have any questions concerning the programming and operation of the equipment described in this manual, please contact your relevant sales office or department (refer to back of cover).
Current information and answers to frequently asked questions are also available through the Internet (www.mitsubishi-automation.com).

MITSUBISHI ELECTRIC EUROPE B.V. reserves the right to change the specifications of its products and/or the contents of this manual at any time without prior notice.

Installation Manual
MELSEC ST Series
Article No.: 163534

Version			Changes/Additions/Corrections
A	04/2005	pdp-dk	First edition

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Safety Information

For qualified staff only

This manual is only intended for use by properly trained and qualified electrical technicians who are fully acquainted with automation technology safety standards. All work with the hardware described, including system design, installation, setup, maintenance, service and testing, may only be performed by trained electrical technicians with approved qualifications who are fully acquainted with the applicable automation technology safety standards and regulations.

Proper use of equipment

The moduls of the MELSEC ST Series are only intended for the specific applications explicitly described in this manual. Please take care to observe all the installation and operating parameters specified in the manual. All products are designed, manufactured, tested and documentated in agreement with the safety regulations. Any modification of the hardware or software or disregarding of the safety warnings given in this manual or printed on the product can cause injury to persons or damage to equipment or other property. Only accessories and peripherals specifically approved by MITSUBISHI ELECTRIC may be used. Any other use or application of the products is deemed to be improper.

Relevant safety regulations

All safety and accident prevention regulations relevant to your specific application must be observed in the system design, installation, setup, maintenance, servicing and testing of these products. The regulations listed below are particularly important. This list does not claim to be complete; however, you are responsible for knowing and applying the regulations applicable to you.

- VDE Standards
  - VDE 0100
    (Regulations for electrical installations with rated voltages up to 1,000V)
  - VDE 0105
    (Operation of electrical installations)
  - VDE 0113
    (Electrical systems with electronic equipment)
  - VDE 0160
    (Configuration of electrical systems and electrical equipment)
  - VDE 0550/0551
    (Regulations for transformers)
  - VDE 0700
    (Safety of electrical appliances for household use and similar applications)
  - VDE 0860
    (Safety regulations for mains-powered electronic appliances and their accessories for household use and similar applications)
- Fire prevention regulations
- Accident prevention regulations
  - VBG No. 4 (Electrical systems and equipment)

Safety warnings in this manual

In this manual special warnings that are important for the proper and safe use of the products are clearly identified as follows:

DANGER:
Personnel health and injury warnings. Failure to observe the precautions described here can result in serious health and injury hazards.

CAUTION:
Equipment and property damage warnings. Failure to observe the precautions described here can result in serious damage to the equipment or other property.

General safety information and precautions

The following safety precautions are intended as a general guideline for using the PLC together with other equipment. These precautions must always be observed in the design, installation and operation of all control systems.

DANGER:

- ***Observe all safety and accident prevention regulations applicable to your specific application. Installation, wiring and opening of the assemblies, components and devices may only be performed with all power supplies disconnected.***
- ***Assemblies, components and devices must always be installed in a shock-proof housing fitted with a proper cover and protective equipment.***
- ***Devices with a permanent connection to the mains power supply must be integrated in the building installations with an all-pole disconnection switch and a suitable fuse.***
- ***Check power cables and lines connected to the equipment regularly for breaks and insulation damage. If cable damage is found, immediately disconnect the equipment and the cables from the power supply and replace the defective cabling.***
- ***Before using the equipment for the first time check that the power supply rating matches that of the local mains power.***
- ***Residual current protective devices pursuant to DIN VDE Standard 0641 Parts 1-3 are not adequate on their own as protection against indirect contact for installations with positioning drive systems. Additional and/or other protection facilities are essential for such installations.***
- ***EMERGENCY OFF facilities pursuant to EN 60204/IEC 204 VDE 0113 must remain fully operative at all times and in all control system operating modes. The EMERGENCY OFF facility reset function must be designed so that it cannot cause an uncontrolled or undefined restart.***
- ***You must also implement hardware and software safety precautions to prevent the possibility of undefined control system states caused by signal line cable or core breaks.***
- ***All relevant electrical and physical specifications must be strictly observed and maintained for all the modules in the installation.***

1 Introduction

The most important characteristics of the MELSEC ST series are summarized in this installation description. This description is designed to help the experienced user quickly start-up the modules. Additional information and a detailed mounting and wiring description is in the MELSEC ST series operating manual. This documentation is provided solely as a quick reference.

1.1 General Description

The MELSEC ST series is a modular input and output system which is connected as slave station to a PROFIBUS/DP network. An ST series station consists of

- a head station to which the PROFIBUS is connected.
- Power supply modules.
- Digital and analog I/O modules.

The I/O modules can be combined as desired according to the requirements.

1.2 Special Features

Reduced wiring effort

– External voltages
for supplying sensors and actuators are connected to the power distribution modules of the ST series only. The other system modules are supplied with power via internal connections. Wiring requirements are significantly reduced because the supply voltage does not need to be connected to each individual module.

– PROFIBUS connection
Only the head station is connected to the PROFIBUS/DP network.

– Connection of the I/O modules
Peripherals are connected either via spring clamp terminals, (into which the wires are just inserted), or via conventional screw clamp terminals.

Flexible System Set-up

The number of inputs and outputs can be adapted easily to the application. Digital modules with 2, 4, and 16 inputs, and with 2 and 16 outputs are available. Up to 63 I/O modules (max. 26 analog I/O modules) can be connected to one head module.

Simple Service

The electronics modules are plugged into a base module to which the peripheral signals are connected. The base module is mounted on a DIN rail. Electronic modules can be replaced in operation. No tool is required to do this. The GX Configurator DP is available to configure the system.

1.3 System Configuration

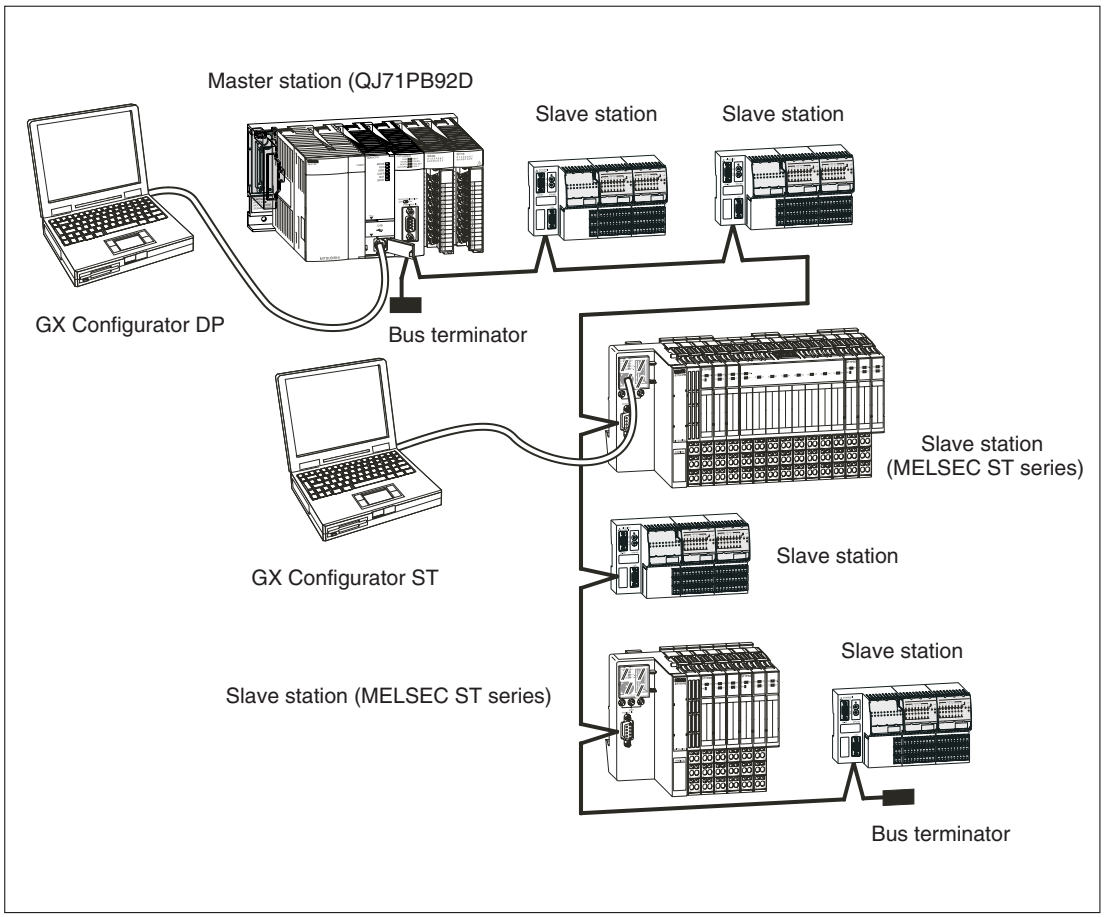
1.3.1 Overview

A slave station set-up with the MELSEC ST series is connected to a PROFIBUS/DP network. Use is not limited to networks with a MELSEC PLC as master station, but is also possible in networks with devices from “third-party” manufacturers.

Populating the stations with ST modules is based on the requirements of the application. Analog modules for capture or output of voltages or currents are available, in addition to digital input and output modules.

“ST” means “Slice Type terminal”, and refers to the narrow width of the modules (only 12.6 mm!). In addition to the narrow modules, cost-saving modules with 16 digital inputs or outputs are also available.

An ST series slave station always consists of a head station, which establishes the connection to the PROFIEBUS/DP network. At least one power distribution module, and the digital and/or analog I/O modules are connected to the head station.



The I/O modules consist of an electronics module and a base module, which establishes the connection to the head station via screw clamp terminals, or spring clamp terminals. The electronics modules are simply plugged onto the base module, which in turn is mounted on a DIN rail. It is not necessary to disconnect the wiring when swapping out a module because the signals are connected to the base module.

1.3.2 Components of the MELSEC ST Series

NOTE A base module is required for mounting each ST series electronics module, except for the head station.

Product		Elektronic module	Description	Applicable base modules*	
				Spring clamp terminals	Screw clamp terminals
Head station		ST1H-PB	For connection to the PROFIBUS	Not necessary	Not necessary
Power distribution modules	Bus refreshing module	ST1PSD	For powering the head station (Supply of 5 V DC and distribution of 24 V DC)	ST1B-S4P2-H-SET	ST1B-E4P2-H-SET
			For increasing the capacity of the 5 V DC supply	ST1B-S4P2-R-SET	ST1B-E4P2-R-SET
	Power feeding module	ST1PDD	Distribution of 24 V DC to the I/O modules	ST1B-S4P2-D	ST1B-E4P2-D
Digital I/O modules	Input modules (Negative common type)	ST1X2-DE1	2 inputs, 24 V DC	ST1B-S4X2	ST1B-E4X2
		ST1X4-DE1	4 inputs, 24 V DC	ST1B-S6X4	ST1B-E6X4
		ST1X16-DE1	16 inputs, 24 V DC	ST1B-S4X16	ST1B-E4X16
	Output modules	ST1Y2-TE2	2 transistor outputs, 24 V DC, 0,5 A, source type	ST1B-S3Y2	ST1B-E3Y2
		ST1Y16-TE2	16 transistor outputs, 24 V DC, 0,5 A, source type	ST1B-S3Y16	ST1B-E3Y16
		ST1Y2-TPE3	2 transistor outputs, 24 V DC, 1 A, source type, short circuit protected	ST1B-S3Y2	ST1B-E3Y2
		ST1Y16-TPE3	16 transistor outputs, 24 V DC, 1 A, source type, short circuit protected	ST1B-S3Y16	ST1B-E3Y16
		ST1Y2-R2	2 contact outputs 240 V AC / 24 V DC, 2 A	ST1B-S4IR2	ST1B-E4IR2
Intelligent function modules	Analog input modules	ST1AD2-V	2 voltage inputs	ST1B-S4IR2	ST1B-E4IR2
		ST1AD2-I	2 current inputs		
	Analog output modules	ST1DA2-V	2 voltage outputs		
		ST1DA1-I	1 current output		

* Base modules with screw clamp terminals and base modules with spring clamp terminals cannot be used together in one system. Use either one of them.

1.3.3 Notes on System Setup

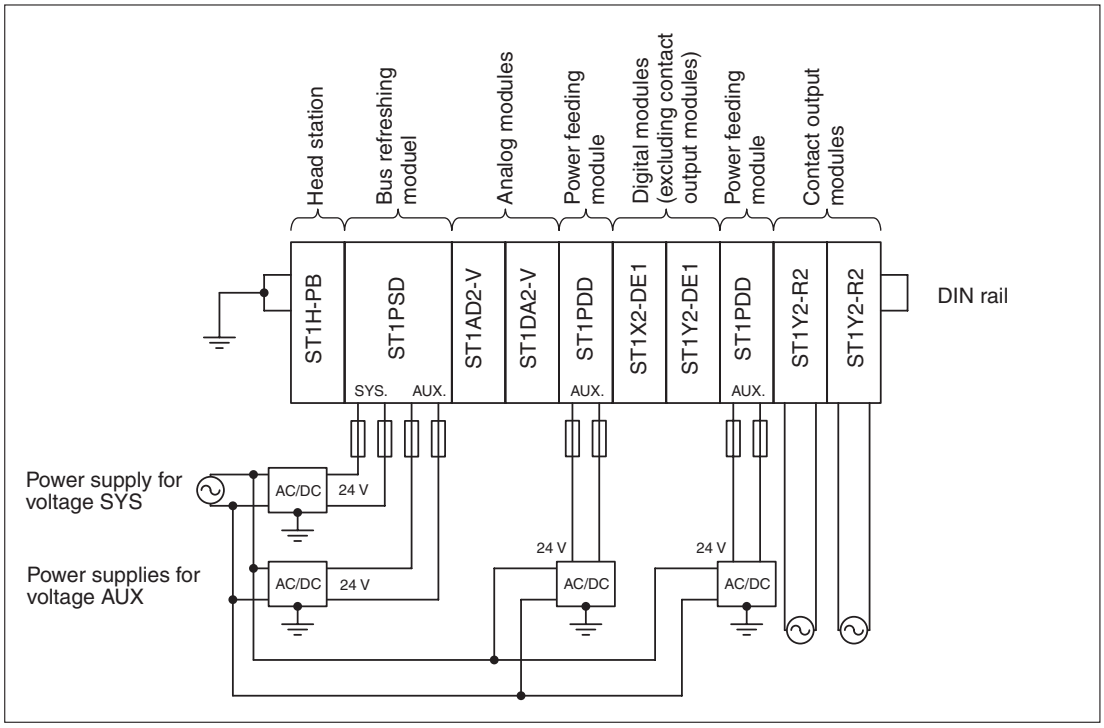
Operation of the **ST1PSD** power distribution module is possible in two different modes: In “H” mode, 24 V DC is made available to supply the head station and the I/O modules, as well as 5 V DC for the backplane bus. In “R” mode only the internal backplane bus is supplied with 5 V DC. The mode (H or R) is selected by using different base modules that are identified by the letters “H” or “R” in the type designation.

At least one ST1PSD is required in “H” mode in order to operate an ST series station. This is installed on the right side of the head station. Additional power supplies (with the “R” base module) are only required if power consumption of the installed ST modules exceeds the capacity a single power distribution module.

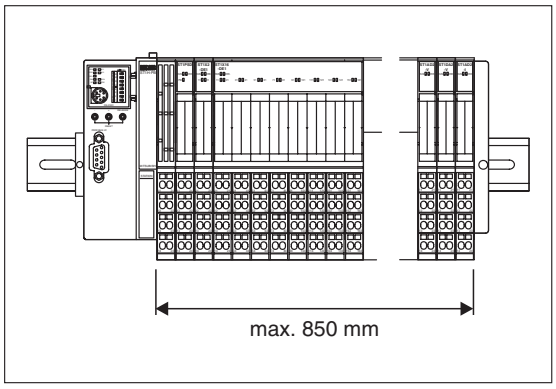
The **ST1PDD** power feeding module supplies the connected actuators and sensors with a 24 V direct current.

Use voltages from different sources to connect to the module's "SYS" and "AUX" terminals. If multiple ST1PSD are used, then all "SYS" voltage inputs must be supplied by the same power source.
The power distribution modules and power feeding modules are not overload-protected. It is strictly required to provide fuses between power supply and module.

Analog modules must be separately supplied with power. Use an ST1PDD to separate the power supply of digital and analog modules. The ST1PDD is mounted on the DIN rail to the left of the modules that it will supply.



The DIN rail on which the modules are mounted must be conductive.



The maximum width of a station consisting of modules of the MELSEC ST series is 850 mm. Please note that the width of the head station is not counted.

2 Specifications

2.1 General Specifications

CAUTION:
Please operate the modules of the MELSEC ST Series in the listed conditions only. If the modules are used under other conditions, electric shock, fire, malfunction, damages or deterioration may be caused.

<table>
<tr><th>Item</th><th colspan="5">Specifications</th></tr>
<tr><td>Operating ambient temperature</td><td colspan="5">0 to +55 °C</td></tr>
<tr><td>Storage ambient temperature</td><td colspan="5">–25 to +75 °C</td></tr>
<tr><td>Ambient humidity for operation and storage</td><td colspan="5">5 to 95 %, relative humidity, non-condensing</td></tr>
<tr><td rowspan="8">Vibration resistance</td><td rowspan="8">Conforms to JISB3501 and IEC61131-2</td><td colspan="4">Intermittent Vibration</td></tr>
<tr><td>Frequency</td><td>Acceleration</td><td>Amplitude (half)</td><td>Sweep count for X, Y, Z</td></tr>
<tr><td>10 to 57 Hz</td><td>—</td><td>0.075 mm</td><td rowspan="4">10 times (80 minutes in each direction)</td></tr>
<tr><td>57 to 150 Hz</td><td>9.8 m/s^2 (1 g)</td><td>—</td></tr>
<tr><td colspan="3">Continuous Vibration</td></tr>
<tr><td>10 to 57 Hz</td><td>—</td><td>0.035 mm</td></tr>
<tr><td>57 to 150 Hz</td><td>9.8 m/s^2 (1 g)</td><td>—</td></tr>
<tr><td>Shock resistance</td><td colspan="5">Conforms to JIS B3501 and IEC61131-2: 15 g, 3 times in each direction X, Y und Z</td></tr>
<tr><td>Operating environment</td><td colspan="5">No dust, soot, corrosive or conductive dust, corrosive or flammable gas</td></tr>
<tr><td>Operating altitude</td><td colspan="5">max. 2000 m above MSL (Main Sea Level)
(Do not use or store the PLC under pressure higher than the atmospheric pressure at MSL (0 m). Doing so can cause malfunction. When using the PLC under pressure, please contact your local representative.)</td></tr>
<tr><td>Installation location</td><td colspan="5">Inside control panel</td></tr>
<tr><td>Overvoltage category ①</td><td colspan="5">II max.</td></tr>
<tr><td>Pollution level ②</td><td colspan="5">2 max.</td></tr>
</table>

① This indicates the section of the power supply to which the equipment is assumed to be connected between the public electrical power distribution network and the machinery within premises. Category II applies to equipment for which electrical power is supplied from fixed facilities. The surge voltage withstand level for up to the rated voltage of 300 V is 2500 V.

② This index indicates the degree to which conductive material is generated in the environment where the equipment is used. Pollution level 2 is when only non-conductive pollution occurs but temporary conductivity may be produced due to condensation.

2.2 Specifications of the Modules

2.2.1 Head Station

Item		ST1H-PB		
PROFIBUS/DP station type		Slave station		
Applicable FDL address		0 to 99 (Factory-set to FDL adress 0)		
Maximum I/O points		Depends on the choosen mode: 32, 64, 128 or 256		
I/O data size		Varies depending on the maximum I/O points (Refer to the following table)		
Number of connectable slice modules	32-point mode	maximum 14 modules		
	64-point mode	maximum 30 modules		
	128-point mode	maximum 62 modules		
	256-point mode	maximum 63 modules		
Transmission specification	Electrical standards and characteristics	EIA-RS485 compliant		
	Applicable cable	Shielded twisted pair cable		
	Network configuration	Bus type (tree type when repeaters are used)		
	Data link method	Polling		
	Transmission encoding method	NRZ		
	Transmission speed and maximum transmission distance ①	Transmission speed	Transmission distance [m per segment]	Max. transmission distance when 3 repeaters are used [m]
		9.6 kbps	1200	4800
		19.2 kbps		
		45.45 kbps		
		93.75 kbps		
		187.5 kbps	1000	4000
		500 kbps	400	1600
		1.5 Mbps	200	800
		3 Mbps	100	400
		6 Mbps		
		12 Mbps		
	Repeater per network	Maximum 3 ①		
	Number of stations	Maximum 32 (including repeater)		
	Number of connectable nodes	32 nodes per segment		
Programming interface		RS232 Mini-DIN socket for diagnostics and configuraton		
Diagnostics LEDs		RUN, ERR, REL, DIA, BF, SYN., FRE., M0, M1		
Number of occupied slices (Width)		2 slots (25.2 mm)		
Number of occupied I/O points	Inputs	4		
	Outputs	4		
Internal power consumption (5 V DC)		530 mA		
Weight		0.1 kg		

① Calculation of the transmission distance [m per network], when repeaters are used:

transmission distance [m per network] = (Number of repeaters +1) x transmission distance [m per segment]

The volume of data that is exchanged between slave and master station depends on the mode that has been set:

Item	32-point mode		64-point mode		128-point mode		256-point mode	
	Input	Output	Input	Output	Input	Output	Input	Output
Bit I/O points	32 bits	32 bits	64 bits	64 bits	128 bits	128 bits	256 bits	256 bits
Word I/O points (variable)	max. 52 words	max. 52 words	max. 52 words	max. 52 words	max. 52 words	max. 52 words	max. 32 words	max. 32 words
Request/Information area	14 bytes	14 bytes	20 bytes	20 bytes	32 bytes	32 bytes	56 bytes	56 bytes
Total	max. 122 bytes	max. 122 bytes	max. 132 bytes	max. 132 bytes	max. 152 bytes	max. 152 bytes	max. 152 bytes	max. 152 bytes

2.2.2 Power Distribution Modules

Item		ST1PSD	ST1PDD
SYS.	Rated input voltage	24 V DC	—
	Rated allowable voltage	24 V DC ±20 %, ripple ratio within 5 %	
	Max. rated input current at 24 V DC	0.7 A	
	Output	5 V DC, maximum 2.0 A	
	Efficiency	≥ 80 %	
AUX.	Rated input voltage	24 V DC	
	Rated allowable voltage	24 V DC +20/ -15 %, ripple ratio within 5 %	
	Max. rated input current at 24 V DC	0.7 A	—
	Output	24 V DC, max. 8.0 A	
Dielectric withstand voltage		500 V AC for 1 minute, 600 V AC for 1 s across SYS. inputs and AUX. inputs	
Insulation resistance		≥ 10 MΩ across SYS. inputs and AUX. inputs (Checked with 500 V DC insulation resistance tester)	
Noise durability		Checked with noise simulator (Peak-to-peak noise voltage: 500 V, noise width/noise frequency: 1 μs/25 to 60 Hz)	
		First transient noise compliant to IEC61000-4-4: 2 kV	
Indication of operating status		LED "SYS": Indicates that 5 V DC are output	—
		LED "AUX": Indicates that 24 V DC are output	
Number of occupied slices (Width)		2 slots (25.2 mm)	1 slot (12.6 mm)
Number of occupied I/O points		2 inputs and 2 outputs	
Internal power consumption (5 V DC)		—	0.06 A
Weight		0.06 kg	0.03 kg

2.2.3 Digital Input Modules

Item		ST1X2-DE1	ST1X4-DE1	ST1X16-DE1
Number of inputs		2	4	16
Isolation method		Photocoupler		
Rated input voltage		24 V DC		
Rated allowable voltage		20.4 tos 28.8 V, ripple ratio within 5 %		
Rated input current		4 mA		
Voltage for ON		≥ 19 V		
Current for ON		≥ 3 mA		
Voltage for OFF		≤ 11 V		
Current for OFF		≤ 1.7 mA		
Input resistance		5.6 kΩ		
Response time	OFF → ON	0.5 ms/1.5 ms or less at 24 V DC Factory setting: 1.5 ms The response time of the input module can be set by using the configuration software of the master station. When the master station is a Mitsubishi Electric PLC, use GX Configurator-DP.		
	ON → OFF			
Maximum current at 24 V DC		2 A (During online module change, the maximum inrush current is 2A per input for approx. 5 ms.)		
Inputs per group		2	4	16
Dielectric withstand voltage		500 V AC for 1 minute across DC external terminals and FG		
Insulation resistance		≥ 10 MΩ (across DC external terminals and FG, checked with insulation resistance tester)		
Noise durability		Tested with noise simulator (Peak-to-peak noise voltage: 500 V, noise width/noise frequency: 1 μs/25 to 60 Hz)		
		First transient noise compliant to IEC61000-4-4: 2 kV		
Protection of degree		IP20		
Indication of operating status		With LEDs RUN, ERR and 1 LED for each input		
Number of occupied slices (Width)		1 slot (12.6 mm)	1 slots (12.6 mm)	8 slots (100.8 mm)
Number of occupied I/O points	Inputs	2	4	16
	Outputs	2	4	16
Internal power consumption (5 V DC)		85 mA	95 mA	120 mA
Weight		0.03 kg	0.03 kg	0.11 kg

2.2.4 Transistor Output Modules (Source Type)

Item		ST1Y2-TE2	ST1Y16-TE2	ST1Y2-TPE3	ST1Y16-TPE3
Number of outputs		2	16	2	16
Isolation method		Photocoupler			
Rated load voltage		24 V DC			
Rated allowable voltage		20.4 to 28.8 V, ripple ratio within 5 %			
Maximum load current		0.5 A/output 1.0 A/group	0.5 A/output, 4.0 A/group	1.0 A/output, 2.0 A/group	1.0 A/output, 4.0 A/group
Maximum inrush curren		4 A, ≤ 10 ms		2 A, ≤ 10 ms	
Leakage current at OFF		≤ 0.1 mA		≤ 0.3 mA	
Maximum voltage drop at ON		typ. 0.2 V DC; max. 0.5 V DC (at a load current of 0.5 A)		typ. 0.15 V DC; max. 0.25 V DC (at a load current of 1.0 A)	
Response time	OFF → ON	≤ 1 ms		≤ 0.5 ms	
	OFF → ON	≤ 1 ms (with rated and resitive load)		≤ 1 ms (with rated and resitive load)	
Surge suppressor		Zener diode			
Protection		One 4.0 A fuse (unchangeable)①	One 6.7 A fuse (unchangeable)①	Thermal protection and short circuit protection After cooling down resp. elimination of the short circuit the operation will continue automatically.	
Indication of activated protective function		When a fuse blows, the ERR. LED is switched on and a signal is output to the head station.②		When a protective function is activated, the ERR. LED is switched on and a signal is output to the head station.	
Outputs per group		2	16	2	16
Dielectric withstand voltage		500 V AC for 1 minute across DC external terminals and FG			
Insulation resistance		≥ 10 MΩ (across DC external terminals and FG, checked with insulation resistance tester)			
Noise durability		Tested with noise simulator (Peak-to-peak noise voltage: 500 V, noise width/noise frequency: 1 μs/25 to 60 Hz)			
		First transient noise compliant to IEC61000-4-4: 2 kV			
Protection of degree		IP20			
Indication of operating status		With LEDs RUN, ERR and 1 LED for each output			
Number of occupied slices (Width)		1 slot (12.6 mm)	8 slots (100.8 mm)	1 slots (12.6 mm)	8 slots (100.8 mm)
Number of occupied I/O points	Inputs	2	16	2	16
	Outputs	2	16	2	16
Internal power consumption (5 V DC), all outputs ON		90 mA	150 mA	95 mA	160 mA
Weight		0.03 kg	0.11 kg	0.03 kg	0.11 kg

① The fuse is provided to prevent the external wiring from burning when the output of the output module is shorted. Therefore, the output module may not be protected. The fuse may not operate if the output module is damaged due to other failure than short circuit.

② A blown fuse is not detected when the external supply power is off.

2.2.5 Contact Output Module

Item		ST1Y2-R2
Number of outputs		2
Isolation method		Photocoupler
Rated load voltage		24 V DC/ 240 V AC
Rated switching current		At 24 V DC: 2 A (resitive load) per output At 240 V AC: 2 A (cosφ = 1) per output 4 A max. per group
Minimum switching load		5 V DC (1 mA)
Maximum switching voltage		125 V DC/264 V AC
Response time	OFF → ON	≤ 10 ms
	ON → OFF	≤ 12 ms
Outputs per group		2
Life of the contacts	Mechanical	≥ 20 million times
	Elektrical	≥ 100000 times at the rated switching voltage/current load
		≥ 100000 times at 200 V AC, 1,5 A; 240 V AC, 1 A (cosφ = 0.7)
		≥ 100000 times at 200 V AC, 1 A; 240 V AC, 0.5 A (cosφ = 0.35)
		≥ 100000 times at 24 V DC, 1 A; 100 V DC, 0.1 A (L/R = 7 ms)
Maximum switching frequency		3600 times/hour
Surge suppressor		Not provided
Fuse		Not provided
Dielectric withstand voltage		2830 V AC rms for 3 cycles (operation altitude 2000 m)
Insulation resistance		≥ 10 MΩ (across external terminals and FG, checked with insulation resistance tester)
Noise durability		Tested with noise simulator (Peak-to-peak noise voltage: 500 V, noise width/noise frequency: 1 µs/25 to 60 Hz)
		First transient noise compliant to IEC61000-4-4: 2 kV
Protection of degree		IP20
Indication of operating status		With LEDs RUN, ERR and 1 LED for each output
Number of occupied slices (Width)		1 slot (12.6 mm)
Number of occupied I/O points	Inputs	2
	Outputs	2
Max. current consumption (24 V DC)		35 mA (when both relays are switched on)
Internal power consumption (5 V DC), all outputs ON		90 mA
Weight		0.04 kg

2.2.6 Analog Input Modules

Item		ST1AD2-V	ST1AD2-I
Number of input channels		2 (1 when differential input signals are used)	
Input characteristics		Single-End or differential connection	
Analog input		-10 to +10 V 0 to 10 V 0 to 5 V 1 to 5 V	0 to 20 mA 4 to 20 mA
Input resistance	at Single-End	1.0 MΩ	125 Ω
	at differential	2.0 MΩ	250 Ω
Resolution		12 bit + sign	
Conversion time		max. 0.1 ms per channel	
Maximum input		±15 V	±30 mA
Total error		±0.2 % (ambient temperature: 20 °C to 30 °C), ±0.4 % (ambient temperature: 0 °C to 20 °C and 30 °C to 55 °C)	
Digital output		16 bit	
Isolation method		The input channels are isolated against the backplane bus by photocouplers. There is no isolation between the channels.	
Dielectric withstand voltage		500 V AC for 1 minute across the external DC terminals and FG	
Insulation resistance		≥ 10 MΩ ((across external DC terminals and FG, checked with insulation resistance tester)	
Noise durability		Tested with noise simulator (Peak-to-peak noise voltage: 500 V, noise width/noise frequency: 1 μs/25 to 60 Hz)	
		First transient noise compliant to IEC61000-4-4: 2 kV	
Indication of operating status		With LEDs RUN and ERR	
Number of occupied slices (Width)		1 slot (12.6 mm)	
Number of occupied I/O points	Inputs	2	
	Outputs	2	
Internal power consumption (5 V DC)		110 mA	110 mA
Weight		0.03 kg	

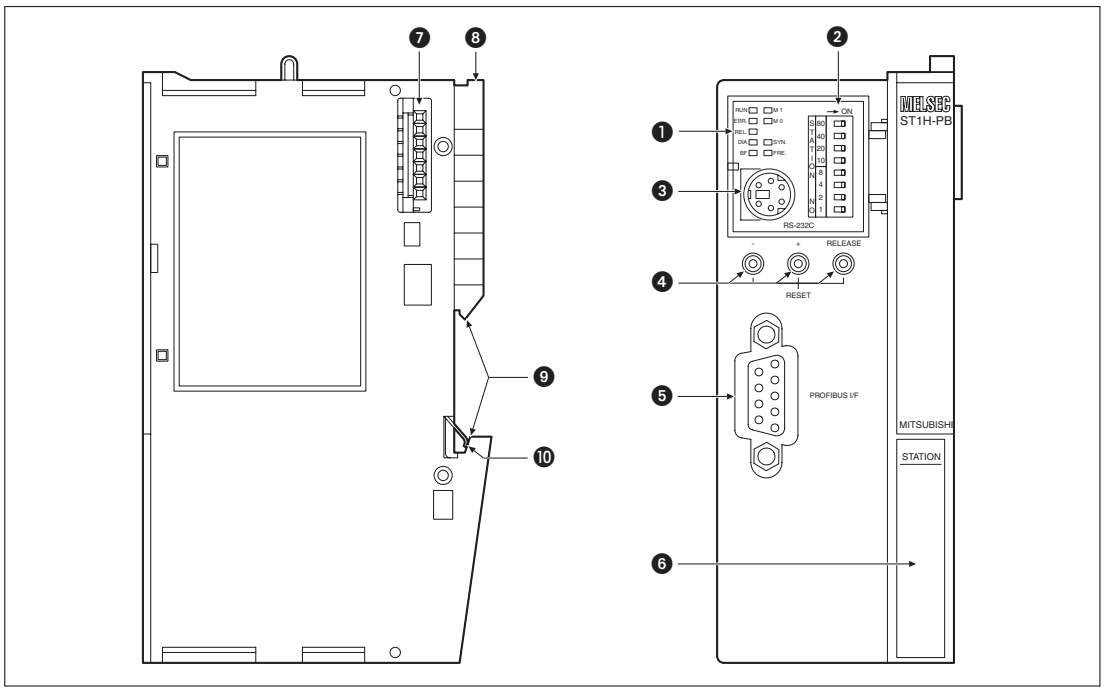
2.2.7 Analog Output Modules

Item		ST1DA2-V	ST1DA1-I
Number of input channels		2	1
Analog output		-10 to +10 V 0 to 10 V 0 to 5 V 1 to 5 V	0 to 20 mA 4 to 20 mA
Resolution		12 bit + sign	
Conversion time		max. 0.1 ms per channel	
Maximum output		±12 V	±21 mA
Total error		±0.2 % (ambient temperature: 20 °C to 30 °C), ±0.4 % (ambient temperature: 0 °C to 20 °C and 30 °C to 55 °C)	
Resistance of the connected load		> 1 kΩ (-10 to +10 V and 0 to 10 V) > 500 Ω (0 to +5 V and 1 to 5 V)	< 500 Ω
Isolation method		The output channels are isolated against the backplane bus by photocouplers. There is no isolation between the channels.	
Dielectric withstand voltage		500 V AC for 1 minute across the external DC terminals and FG	
Insulation resistance		≥ 10 MΩ ((across external DC terminals and FG, checked with insulation resistance tester)	
Noise durability		Tested with noise simulator (Peak-to-peak noise voltage: 500 V, noise width/noise frequency: 1 µs/25 to 60 Hz)	
		First transient noise compliant to IEC61000-4-4: 2 kV	
Indication of operating status		With LEDs RUN and ERR	
Number of occupied slices (Width)		1 slot (12.6 mm)	
Number of occupied I/O points	Inputs	2	
	Outputs	2	
Internal power consumption (5 V DC)		95 mA	95 mA
Weight		0.03 kg	

3 Description of the Modules

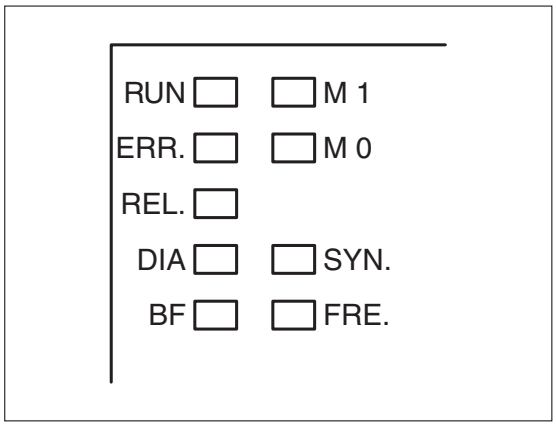
3.1 Head Station

3.1.1 Overview



Number	Meaning	Description
❶	LEDs	The LEDs show the operating status of the head station. (refer to the next page)
❷	Switches for setting the station number	These switches are used to set the station number and to activate the self-diagnostics. Range for the station number: 0 to 99 (factory setting: 0) Selection of self-diagnostics: 150 Refer to chapter 3.1.3 for a detailed description.
❸	RS232 interface	For diagnostics and configuration a personal computer with the software GX Configurator DP installed (version 6.0 or later) is connected with this Mini-DIN socket.
❹	Buttons ("-", "+" and "RELEASE")	Used to make online module change and to reset the head station..
❺	PROFIBUS/DP interface	Connects the PROFIBUS/DP cable to the head module.
❻	Display plate	Write the station number of the head station on this plate
❼	Base module connector	Connects the next module (always a power distribution module) to the right of the head station.
❽	Lock lever	To remove the head station from the DIN rail, a screwdriver is inserted in this lever from the front of the module and then pulled downward.
❾	DIN rail mounting groove	Mounts the head station to the DIN rail.
❿	FG contact	Grounding metal spring on the back of the head station. FG of all mounted modules ist connected via the conductive DIN rail.

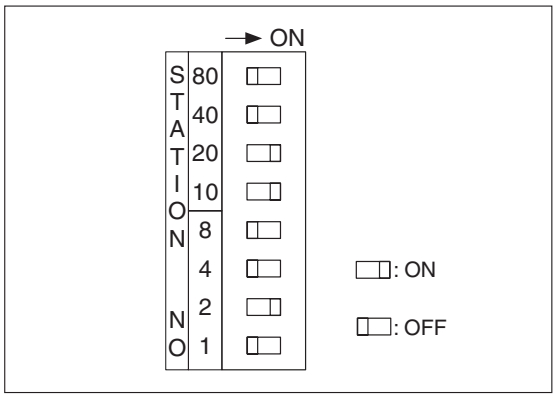
3.1.2 LEDs of the Head Station



LED	LED status	Meaning
RUN	ON	Normally operating
	Flickering	● Self-diagnostics are being executed ● Forced output test mode is being executed
	OFF	● The external power is off. ● A watchdog timer error has been occured.
ERR.	ON	A error occured in the head station or in a slice module.
	Flickering	● Communication error ● The station number has been changed after the head station was powered on.
	OFF	Normally operating (no error)
REL.	ON	During online module change the settings of the selected slice module were saved and the module can now be remounted.
	Flickering	After changing a slice module the settings are loaded to the new module.
	OFF	Online module change has been completed or is not selected.
DIA	ON	Extended diagnostic information being sent to master station
	Flickering	Self-diagnostics of head module being executed.
	OFF	No extended diagnostic information.
BF	ON	PROFIBUS/DP data communication is stopped.
	OFF	PROFIBUS/DP data communication normal
M1 M0	—	The LEDs M0 and M1 indicate the maximum input/output points setting status of the head module:
SYN.	ON	SYNC mode is activated.
	OFF	Normally operating
FRE.	ON	FREEZE mode is activated.
	OFF	Normally operating

Maximum I/O points	LED status	
	M1	M0
32	OFF	OFF
64	OFF	ON
128	ON	OFF
256	ON	ON

3.1.3 Switches



Use the head station switches to set the station number for addressing this slave station in the PROFIBUS/DP.

The station number can be set in a range between 0 and 99. If the value “150” is set, then the head module executes a self diagnosis.

Each of the 8 switches has a certain value. The total set value is a result of the sum of the values of all switches that are in the “ON” position.

Station number	Settings							
	10s place				1s place			
	80	40	20	10	8	4	2	1
0	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF
1	OFF	OFF	OFF	OFF	OFF	OFF	OFF	EIN
2	OFF	OFF	OFF	OFF	OFF	OFF	ON	OFF
3	OFF	OFF	OFF	OFF	OFF	OFF	OFF	ON
4	OFF	OFF	OFF	OFF	OFF	ON	OFF	OFF
• •	• •	• •	• •	• •	• •	• •	• •	• •
10	OFF	OFF	OFF	ON	OFF	OFF	OFF	OFF
11	OFF	OFF	OFF	ON	OFF	OFF	OFF	ON
• •	• •	• •	• •	• •	• •	• •	• •	• •
98	ON	OFF	OFF	ON	ON	OFF	OFF	OFF
99	ON	OFF	OFF	ON	ON	OFF	OFF	ON
Self-diagnostics	**80**	**40**	**20**	**10**	**8**	**4**	**2**	**1**
150	ON	ON	ON	ON	OFF	OFF	OFF	OFF

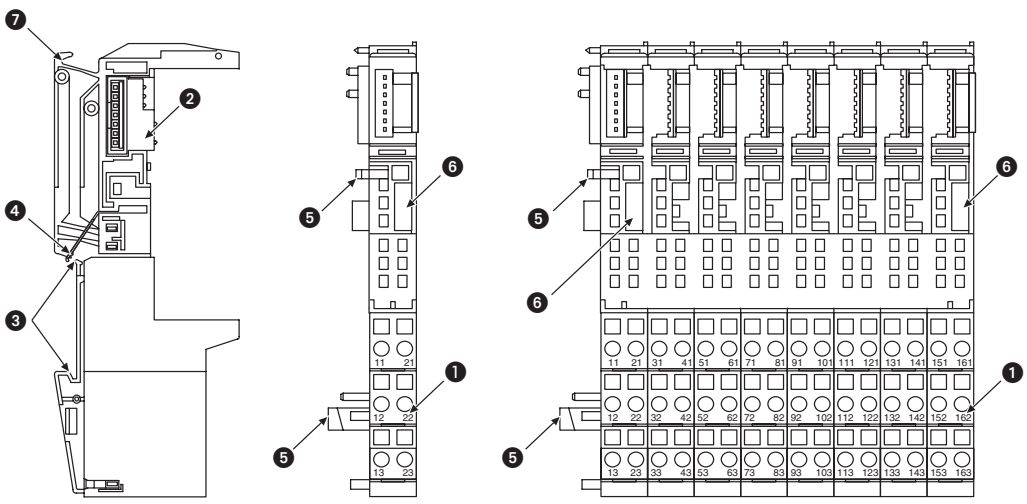
For example, in the illustration above station number 32 is set.

NOTES

Only set station numbers in the range of 0 to 99, and set the value “150” for self-diagnostics. If other values are set, then an error will occur after switching on or resetting the head module.

The sum resulting from the switch settings for the single digits (8, 4, 2, and 1) may not exceed the value of “9”.

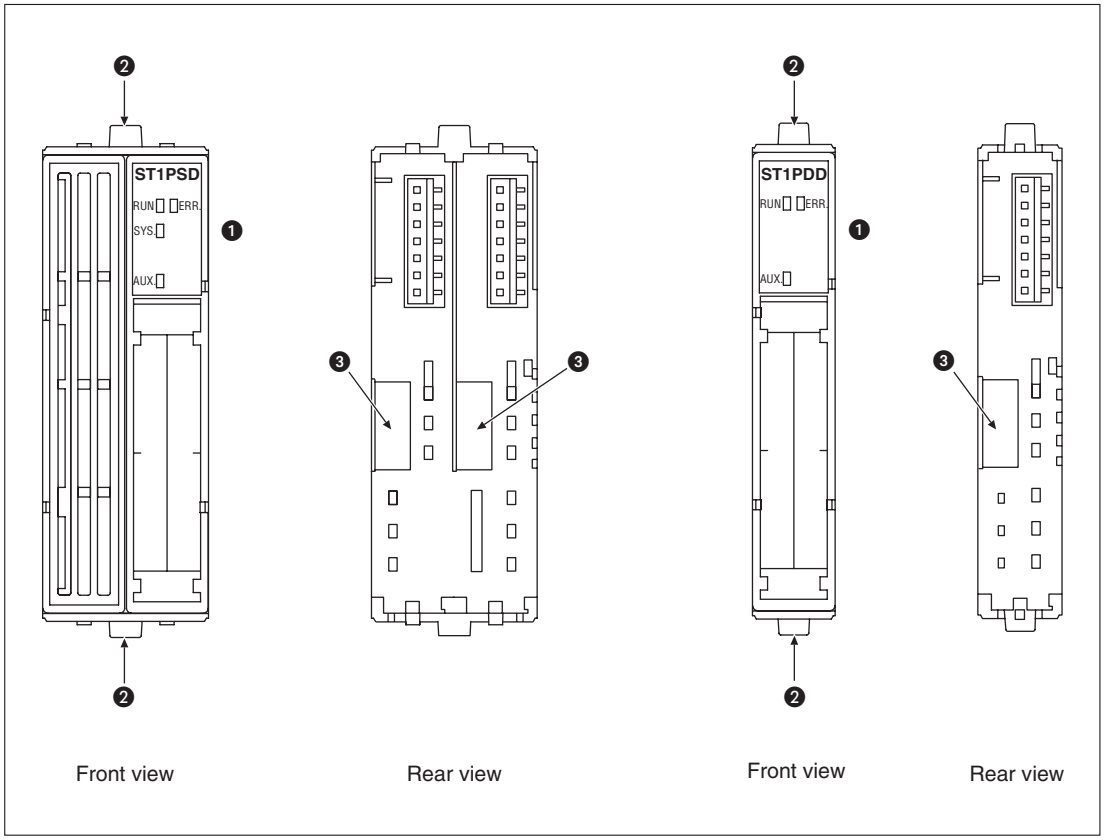
3.2 Base Modules



Number	Meaning	Description
❶	External wiring terminal block	Terminal block for connection of external wiring. The terminal block color changes depending on the slice module type. ● Dark grey: I/O modules ● Redt: Power distribution modules The terminal block for shield has light gray stripes.
❷	Base module connector	Connector for electrical connection between base modules. The connector color changes depending on the base module type. ● Dark gray: For bus refresh module (for powering the head module), power feeding modules and I/O modules. ● Yellow: For bus refresh module (for extension)
❸	DIN rail mounting groove	Mounts the head station to the DIN rail.
❹	FG contact	Grounding metal spring on the back of the head station. FG of all mounted modules ist connected via the conductive DIN rail.
❺	Fixing hook	Hook for coupling with an adjacent base module.
❻	Coding element mounting holes	The coding element is fixed in this hole automatically while mounting a slice module for the first time.
❼	Lock lever	To remove the base module from the DIN rail, insert a screwdriver in this lever from the front of the module and then pulled the screwdriver downward.

3.3 Power Distribution Modules

3.3.1 Overview



Number	Meaning	Description
❶	LEDs	The LEDs show the operating status of the module. (refer to chapter 3.3.2)
❷	Slice module fixing hooks (both ends)	Hooks for mounting/removing the slice module to/from the base module. Hold down the hooks at both ends, and remove the module.
❸	Coding elements	Provided to prevent a wrong slice module from being inserted into the base module. The slice module can be inserted only when the coding element of the base module matches that of the slice module.

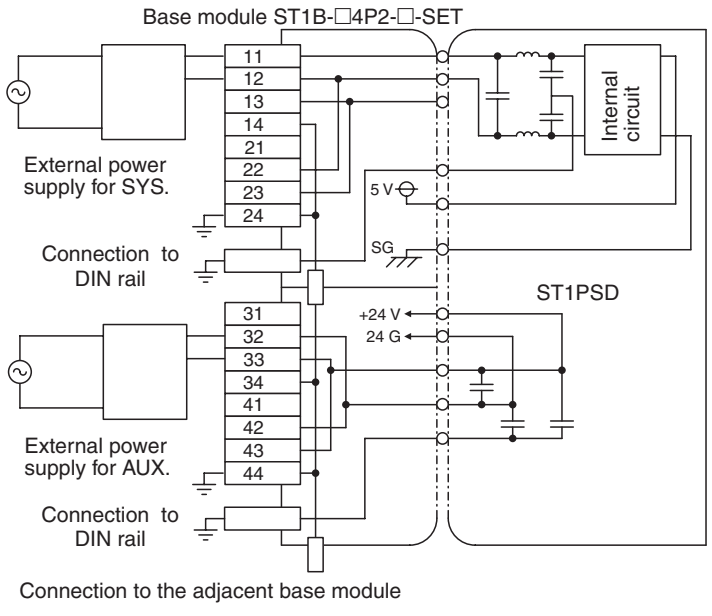
3.3.2 LEDs of the Power Distribution Modules

LED	LED status	Meaning
RUN	ON	Normally operating
	Flickering	Flickering in 0.25 s intervals Selected as a module to be replaced online. Power distribution modules cannot be changed while the station is operating. Continue the selection until the RUN LED on the desired module is flickering.
	Flickering	Flickering in 1 s intervals ● Communication with the master station has stopped. ● Slave parameter setting error ● Other slice module fault ● Internal bus error
	OFF	● The external power is off. ● Hardware fault ● Internal bus error
ERR.	ON	Hardware fault
	Flickering	The external power supply voltage (24 V DC) is to low.
	OFF	Normally operating
SYS.	ON	The module provides both the 24 V DC and the 5 V DC voltage.
	OFF	24 V DC voltage low and 5 V DC voltage low.
AUX.	ON	The 24 V DC voltage is output.
	OFF	24 V DC voltage low

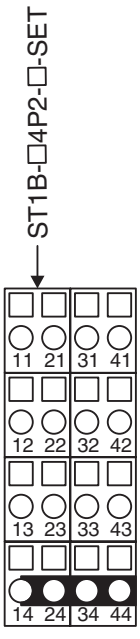
3.3.3 Terminal Layout and External Connections

Bus Refreshing Module ST1PSD

External Connections



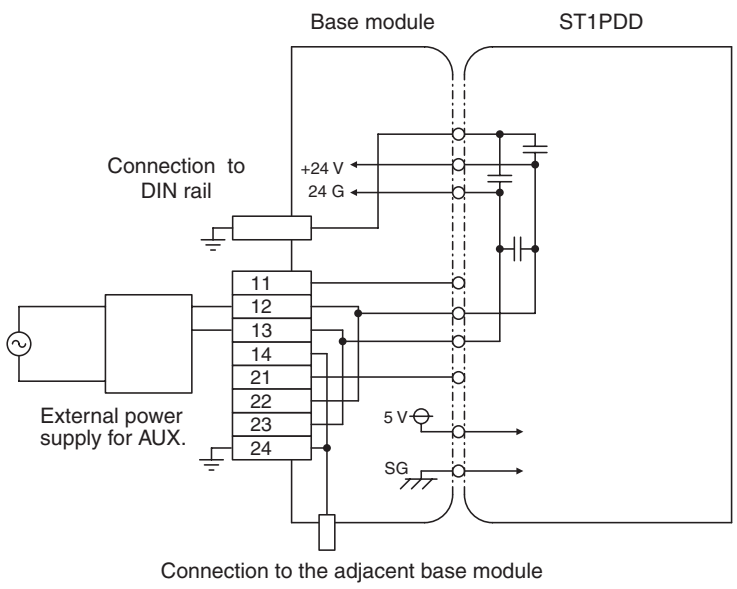
Terminal Block



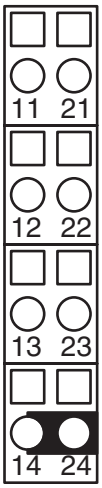
Terminal	Signal	
11	24 V (SYS.)	+
12		-
13	Not connected	
14	Shield	
21	Nicht belegt	
22	24 V (Minuspol)	
23	Not connected	
24	Shield	
31	Not connected	
32	24 V (AUX.)	-
33		+
34	Shield	
41	Not connected	
42	24 V (AUX.)	-
43		+
44	Shield	

Power Feeding Module ST1PDD

External Connections



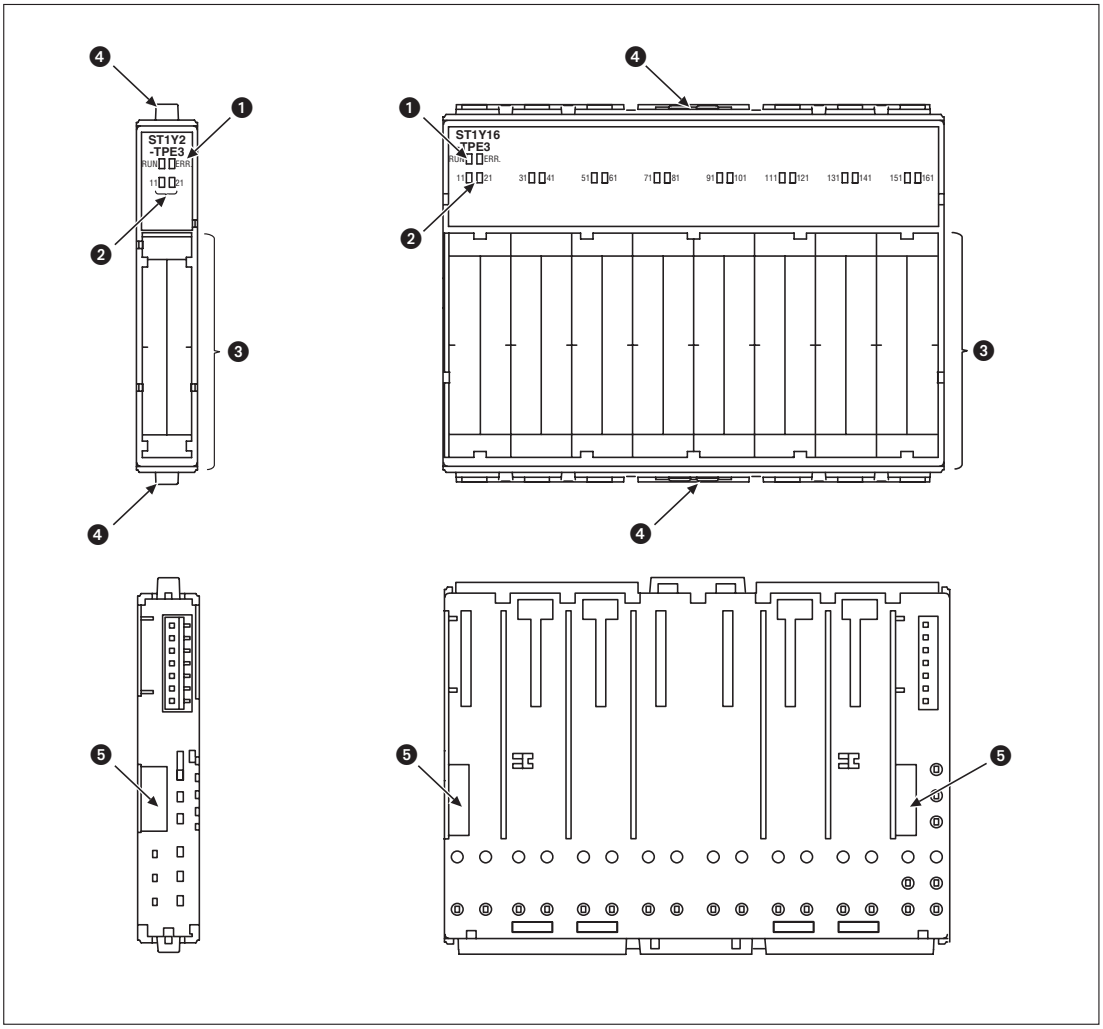
Terminal Block



Terminal	Signal	
11	Not connected	
12	24 V (AUX.)	-
13		+
14	Shield	
21	Not connected	
22	24 V (AUX.)	-
23		+
24	Shield	

3.4 I/O Modules

3.4.1 Overview



Number	Meaning	Description
❶	RUN LED and ERR. LED	The LEDs show the operating status of the module. (refer to page 27) The background colour of the LEDs is a indicator for the type of module: ● Light grey: Digital input modules ● Orange: Digital output modules (transistor output) ● Brown: Digital output modules (contact output) ● Green: Analog input modules ● Blue: Analog output modules
❷	I/O status LEDs	Indicate whether the inputs/outputs are ON or OFF. The LED is lit when the corresponding input/output is ON.
❸	Face plate	Use the symbol label to note the names of external connections. A diagram of the wiring to the base module is printed on the surface. When checking the wring diagram, remove the symbol label.
❹	Slice module fixing hooks (both ends)	Hooks for mounting/removing the slice module to/from the base module. Hold down the hooks at both ends, and remove the module.
❺	Coding element	Provided to prevent a wrong slice module from being inserted into the base module. The slice module can be inserted only when the coding element of the base module matches that of the slice module.

3.4.2 LEDs of the I/O Modules

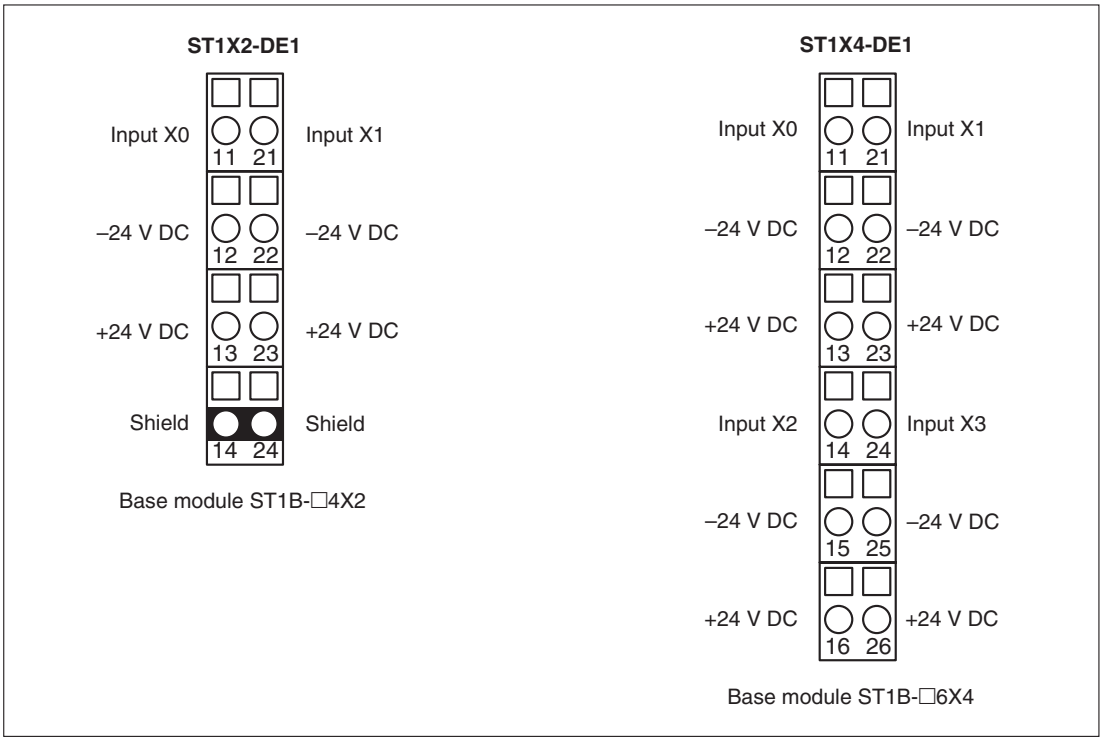
LED	LED	Meaning
RUN	ON	Normally operating
	Flickering	Flickering in 0.25 s intervals Selected as a module to be replaced online.
		Flickering in 1 s intervals ● Communication with the master station has stopped. ● Slave parameter setting error ● Other slice module fault ● Internal bus error
	OFF	● The external power is off. ● Hardware fault ● Internal bus error
ERR.	ON	Hardware fault For output modules ST1Y2-TE2 and ST1Y16-TE2 only: The fuse has blown.
	Flickering	For output modules ST1Y2-TPE3 und ST1Y16-TPE3 only: Thermal protection or short circuit protection is activated
	OFF	Normally operating

3.4.3 Terminal Layout

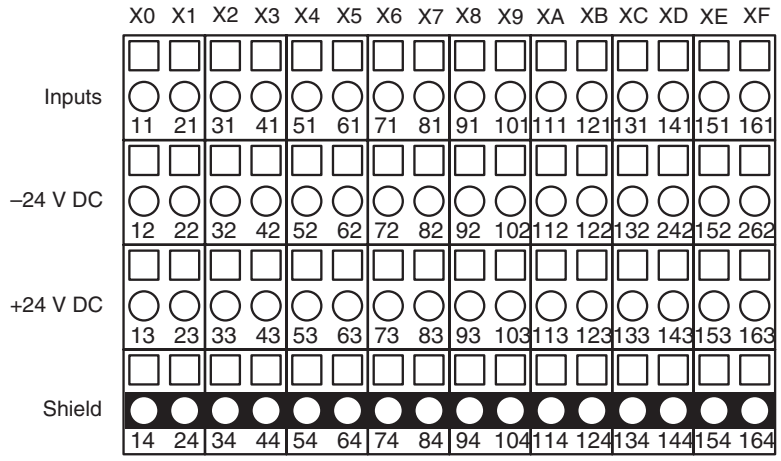
The following illustrations show the signals that are assigned to the base module terminals, when the corresponding electronics modules is mounted.
In the base module designations, the place holder "□" stands for the letters “S” (spring clamp terminal) or “E” (screw clamp terminal).

With the input modules the terminals supply the 24 V DC power for the connected switches or sensors. Terminals with the same designations (for example “COM”) are connected together internally.

Digital Input Modules ST1X2-DE1 and ST1X4-DE1

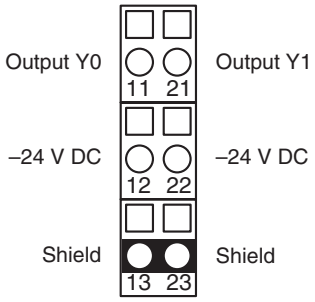


Digital Input Module ST1X16-DE1



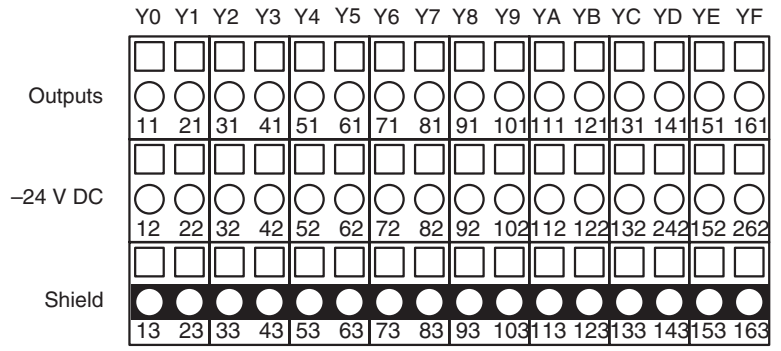
Base module ST1B-□4X16

Digital Output Modules ST1Y2-TE2 and ST1Y2-TPE3



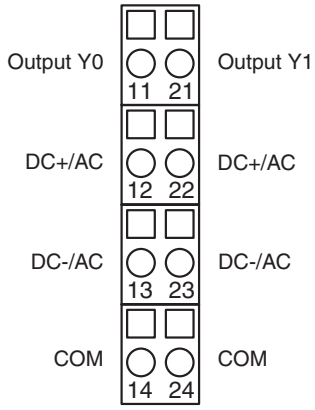
Base module ST1B-□3Y2

Digital Output Modules ST1Y16-TE2 and ST1Y16-TPE3



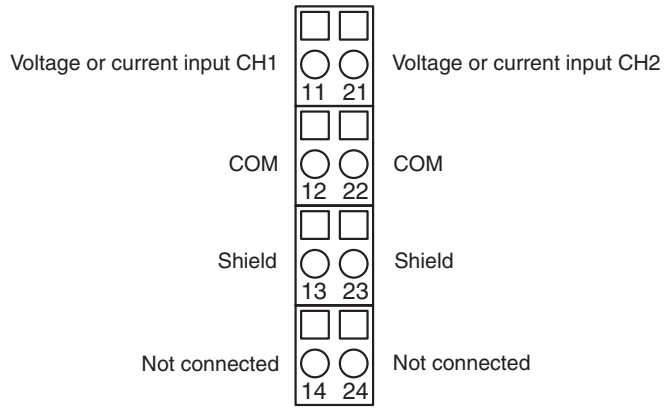
Base module ST1B-□3Y16

Contact Output Module ST1Y2-R2



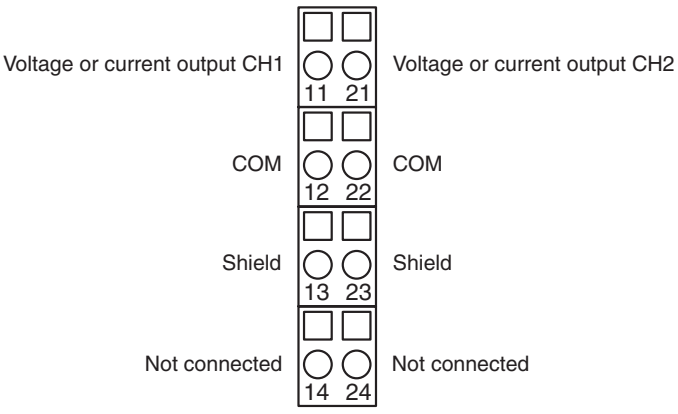
Base module ST1B-□4IR2

Analog Input Modules



Base module ST1B-□4IR2

Analog Output Modules



Base module ST1B-□4IR2

4 Installation

4.1 Handling Instructions

Precautionary measures

Because the casings and the terminal cover are made of plastic, ensure that the modules are not subjected to mechanical stresses or strong jolts. Under no circumstances may the circuit boards be removed from the device. During the installation ensure that no wires or metal shavings penetrate into the casing.

Tighten the terminal screws and the anchoring screw of the end plate to the torques specified in the following table:

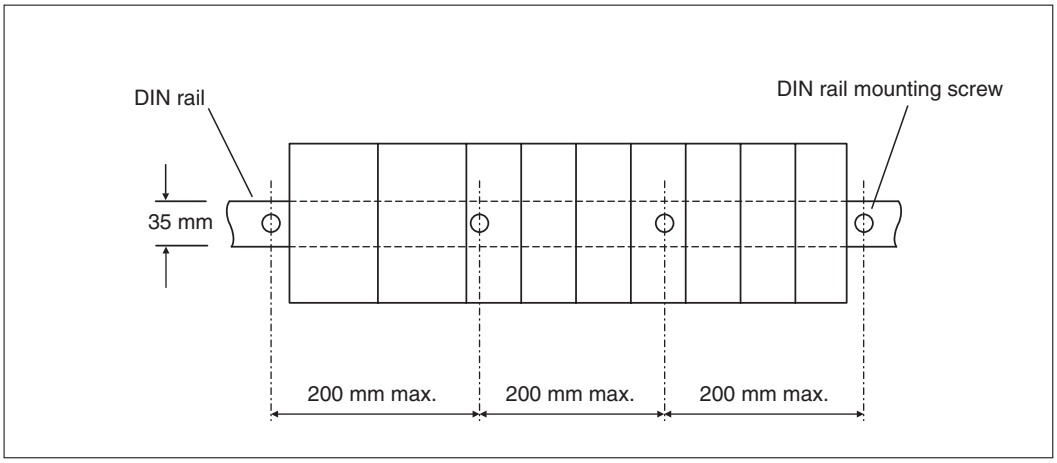
Screw	Tightening torgue range
Base module terminal block screw	0.27–0.80 Nm
End bracket screw	0.50–0.60 Nm

ATTENTION:
Do not open the module casing. Do not modify the module.
Malfunctions, injury and/or fire can result.

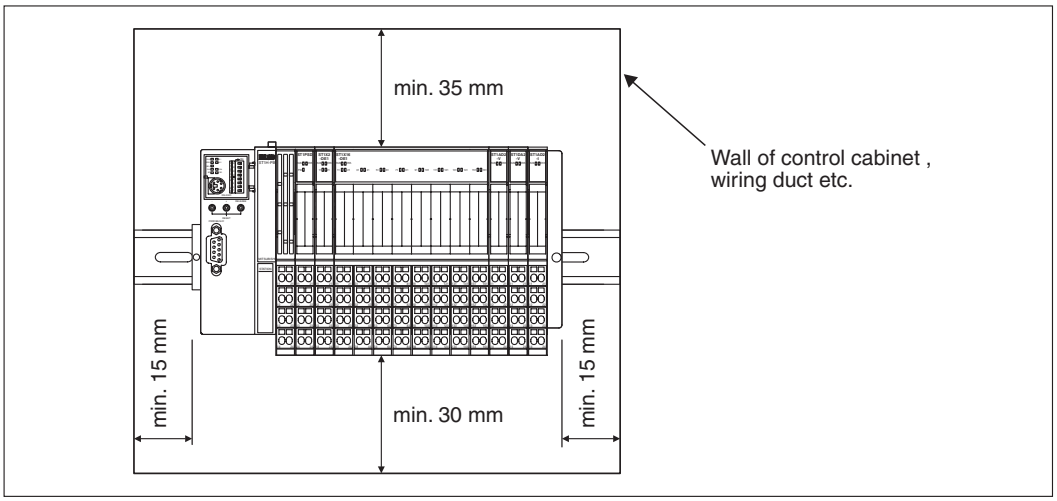
The ST modules are designed for mounting on a DIN rail. If the modules are not operated on a DIN rail, then malfunctions can occur.

4.2 Mounting the DIN Rail

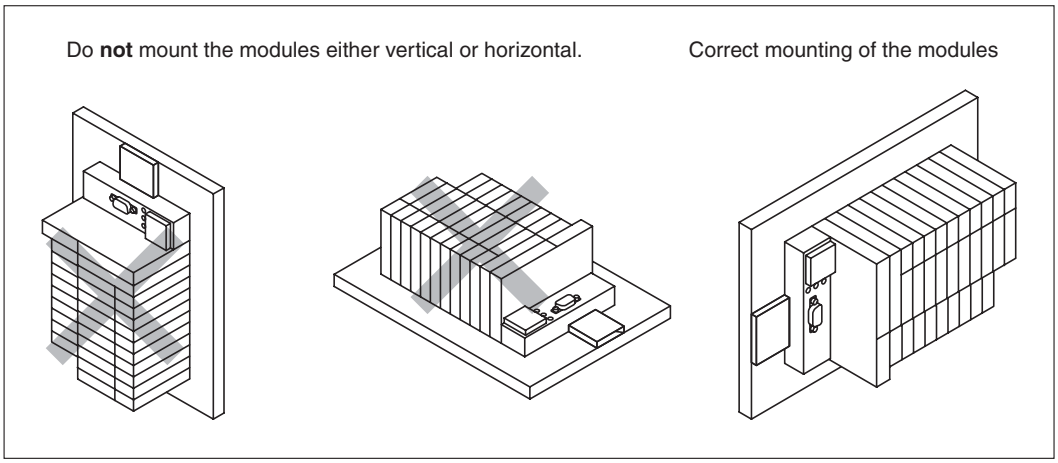
- Use a rail in accordance with DIN 50022 with a width of 35 mm to mount the modules. In addition to anchoring the modules the DIN rail is also used to connect the device grounding of the individual modules. For this reason, the DIN rail must be conductive (made of metal and non-insulated).
  To ensure secure mounting, the screws for anchoring the rail may not be spaced more than 200 mm from each other:



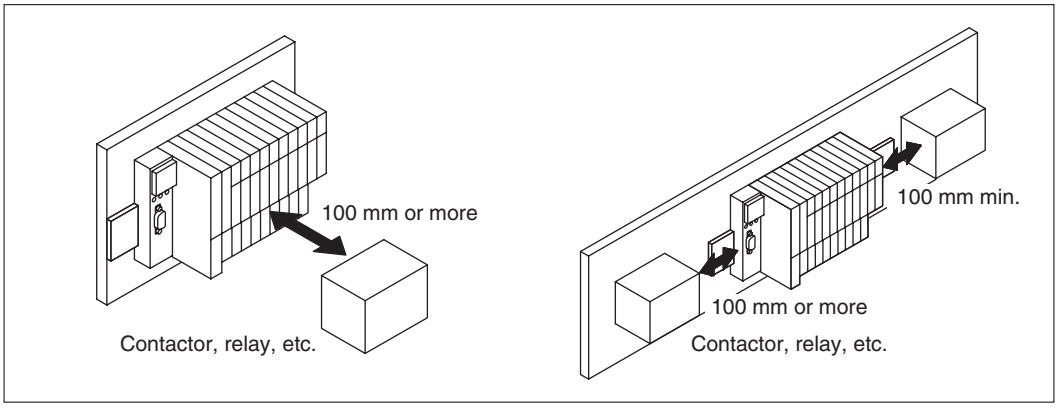
- To ensure proper ventilation and to facilitate module replacement, the following clearances should be maintained around an ST station:



- When mounting, please pay attention to alignment of the modules to ensure adequate ventilation:

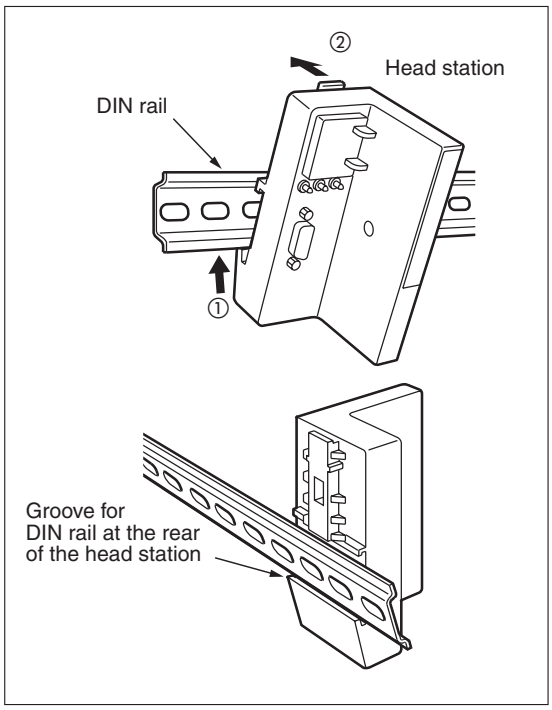


- The DIN rail should be mounted on a level substrate to avoid torsion.
- Mount the ST modules in a separate control cabinet or at a sufficient distance away from electromagnetic switching devices that cause vibrations and emissions. There must be clearance of at least 100 mm between ST modules and such devices.



4.3 Mounting the Modules

4.3.1 Mounting of the Head Station



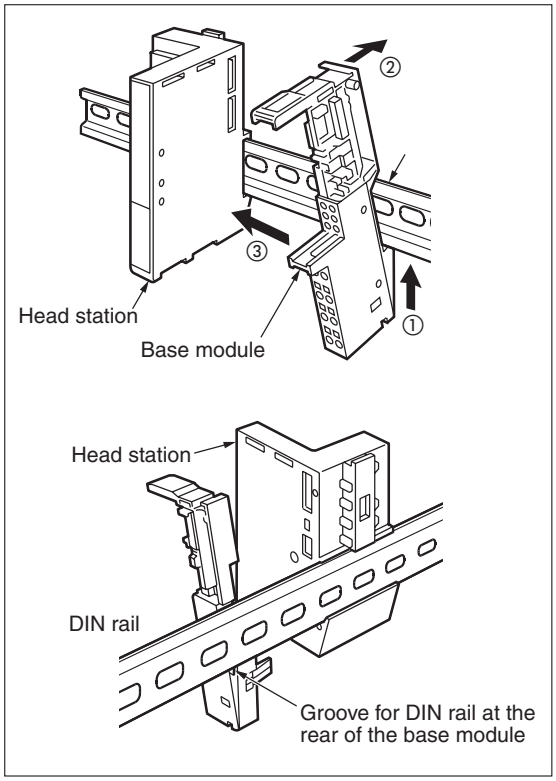
① Lightly tip the head module forwards and hook the module under the rail with the lower limit of the DIN rail cutout.

② Now press the head module in the direction of the DIN rail until the module clicks into the place and is securely anchored on the DIN rail.
Allow sufficient space to the left of the head module for the anchoring clips (see page 34).

4.3.2 Mounting of the Base Modules

NOTE

Base modules with spring clamp terminals and base modules with screw clamp terminals may not be used in the same station.



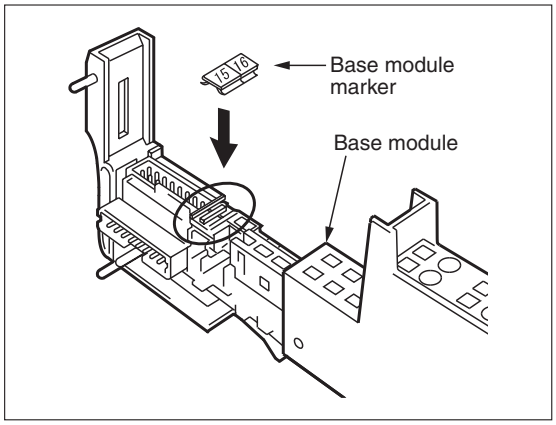
① Lightly tilt the base module forwards lightly and hook it under the DIN rail with the lower limit of rail.

② Now press the base module in the direction of the DIN rail, until the module clicks into place and is securely anchored on the DIN rail.

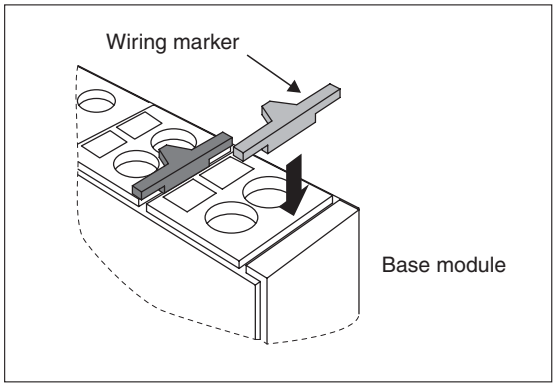
③ Push the base module on the DIN rail to the left to establish the electrical connection with the head station or with another base module.

Mount the other base modules in the same manner. In this process pay attention to a secure anchoring on the DIN rail. There cannot be any gap between the head module and the first base module, and between the base modules.

Mounting the Base Module Markers and Wiring Markers



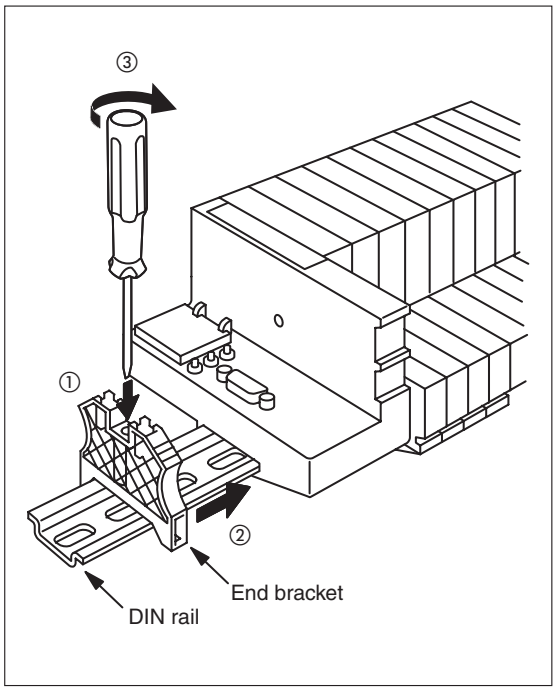
Place the base module markers in the apertures provided underneath the connection for an electronics module.



The wiring is identified and diagnostics are simplified with the colored wiring markers. Color coding is listed in the following table. Plug each wiring marker in the slots underneath the terminals.

Colour of wiring marker	Meaning
Black	Signal wires
Red	Positive pole of a DC voltage (24 V DC, 5 V DC)
Blue	Positive pole of a DC voltage (24 V DC, 5 V DC) N conductor of an AC voltage
Red/Blue	System power supply
Yellow/Green	Protective earth
Green	Shield
Brown	Phase of an AC voltage (L1)

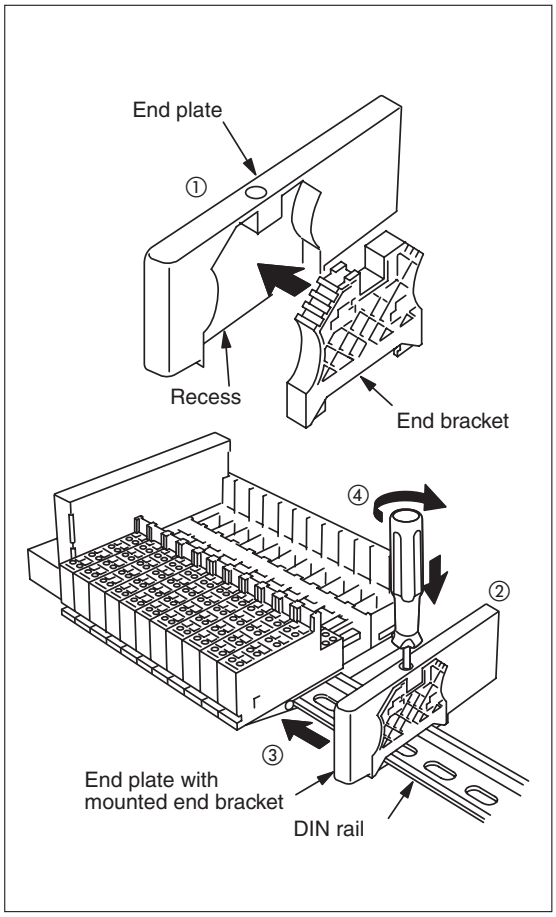
4.3.3 Mounting the End plate and the End Bracket



① Place an end bracket on the left side of the head module on the DIN rail.

② Push the end bracket until it reaches the head station.

③ Firmly tighten the end bracket's screw.



① Guide an end bracket into the cutout of the end plate.

② Place the end plate next to the last base module on the DIN rail.

③ Push the end plate with the end bracket to the left until it reaches the base module.

④ Firmly tighten the screw of the end bracket through the hole in the end plate.

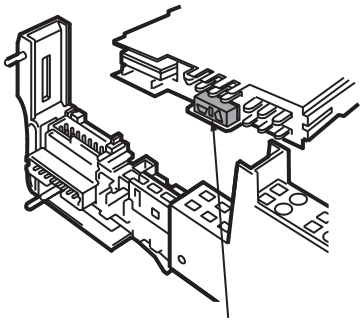
4.3.4 Mounting the Electronics Modules

NOTES

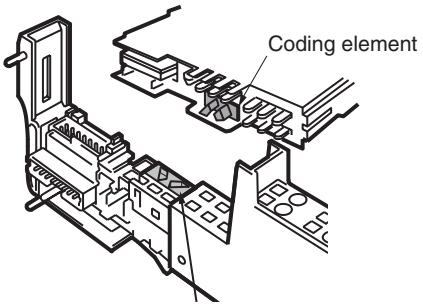
Wire the base modules prior to mounting the electronics modules.

The electronics modules are fitted with two-piece mechanical module coding. When the modules are delivered, both parts of the coding are anchored to the module. When mounting an electronics modules for the first time in a base modules, a part of the coding is automatically anchored in the base module. When removing the electronics module this part remains in the base module. This ensures that when replacing an electronics modules only a module of the same type can be inserted in the base module. When you install an electronics modules in a base module for the first time, you will feel light resistance, while the coding element is anchored in the base module. Nevertheless push the electronics modules all the way into the base module until it clicks into place.

Before shipment: Both coding elements are attached to the slice module.



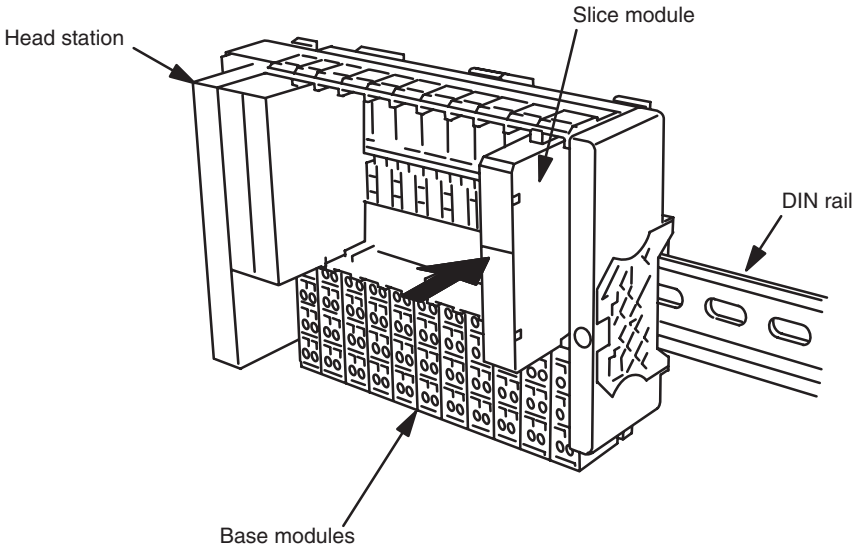
When a slice module is remounted, the coding elements are separated.



Do not use excessive force if an electronics module cannot be inserted in a base module. In this case, check whether a code element is already installed in the base module.

Prior to mounting the electronics modules the head station, the base modules, the end bracket and the end plate must be anchored onto the DIN rail.

Check whether the correct base module is installed for the electronics module (see chapter 1.3.2). Push the electronics modules into the base module until it clicks into place.



4.4 Wiring

DANGER:
To avoid electronic shocks and damages to the power distribution of the PLC, for wiring work switch off the PLC on all poles.

Rigid wires with a cross-section of 0.5 to 2.5 mm^2 and flexible wires with a cross-section of 0.5 to 1.5 mm^2can be connected to the terminal blocks of the base modules. Flexible wires must be equipped with wire end-sleeves.

4.4.1 Connecting the Supply Voltage

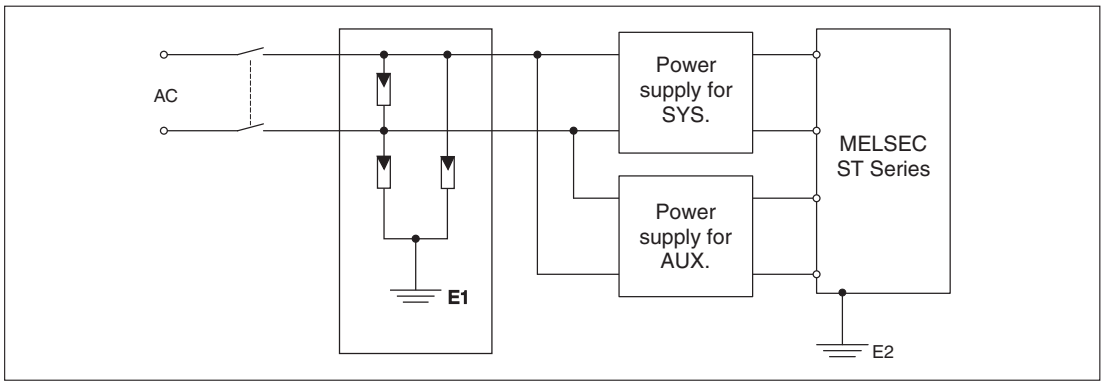
ATTENTION:
Check before connecting the ST modules whether the supply voltage from an external power supply is within the range permissible for the ST module.

The supply voltage of the ST modules should be separated from the supply of the inputs and outputs and the supply of the other devices. If there are strong emissions use a separate power supply which provides 24 V DC for the “SYS” and “AUX” voltages of the ST modules.

The wires with the supply voltage (24 V DC) should be twisted together and laid out in the shortest possible path. Use the maximum possible cross section for these wires (2.5 mm^2).

The lines for direct current voltage supply (24 V DC) may not be laid out together with lines that conduct high voltages, high currents, or I/O signals. To the extent possible a minimum clearance of 100 mm should be maintained between the lines.

Surge suppressors should be used to protect against over-voltage (for example due to lightning):



NOTES

The earthing of the surge protector (E1) and that of the MELSEC ST system (E2) must be executed separately from each other.

Lay out the surge protector in such a manner that it is not tripped by permissible voltage fluctuations.

Also note the instructions for system set-up in chapter 1.3.3.

4.4.2 Connecting the I/O Signals

Assignment of base module terminal blocks is described in section 3.4.3.

The lines to the inputs and outputs should always be laid out separately.

Use insulated lines, if the lines with input and output signals cannot be laid out at a sufficient distance from network lines, or from lines that conduct high currents. Analog signals should always be connected via insulated lines. Connect the shielding of the line on one side to the terminals provided on the MELSEC ST station. The terminals, ST1A-SLD-S (for spring clamp terminals) and ST1A-SLD-E (for screw clamp terminals) are available for this purpose.

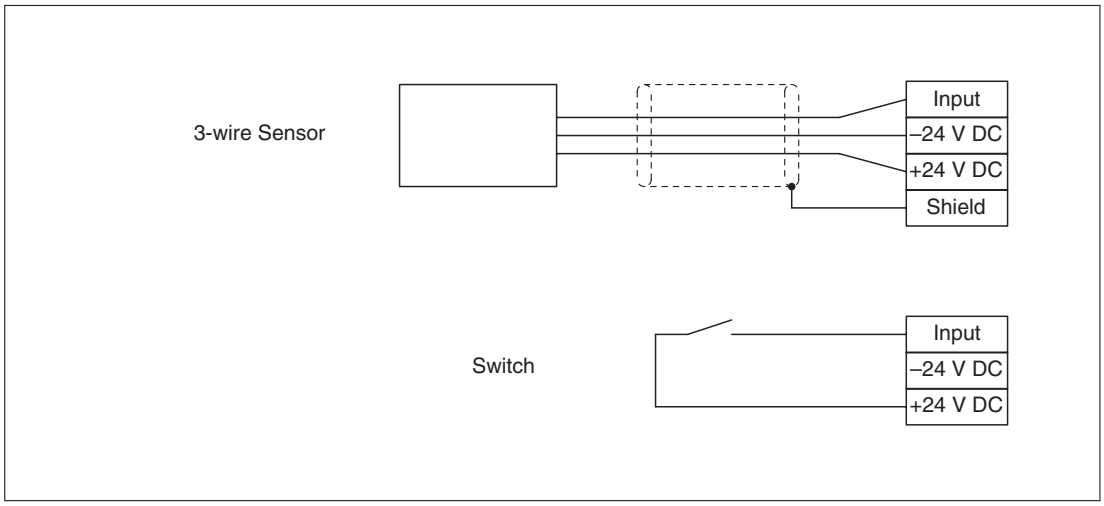
Metal conduit or cable channels that the wiring runs through, must be earthed.

Lines that conduct input or output signals (24 V DC) must be laid out separately from lines that conduct alternating current 110 / 230 V).

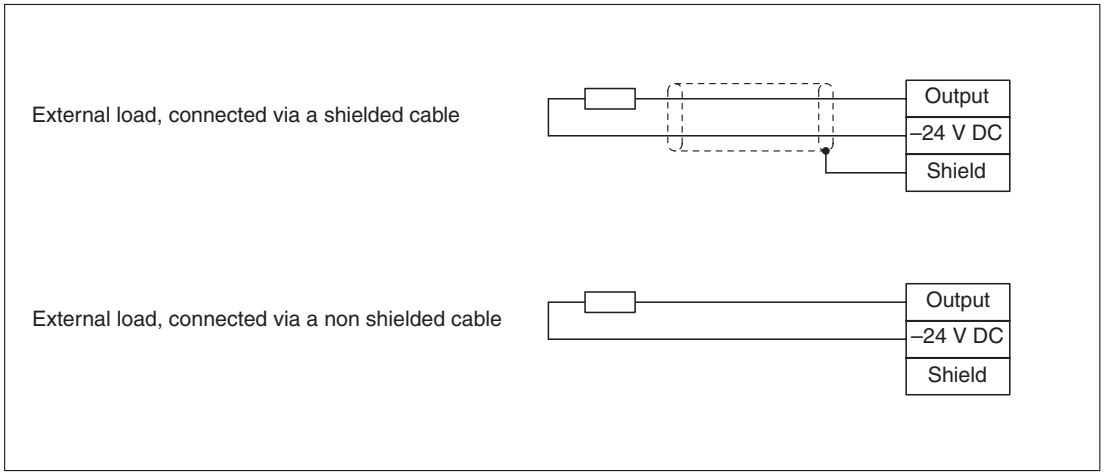
NOTE For line lengths over 200 m, capacity losses may occur which can corrupt the input signals.

The following illustrations show the connection of the I/O signals.

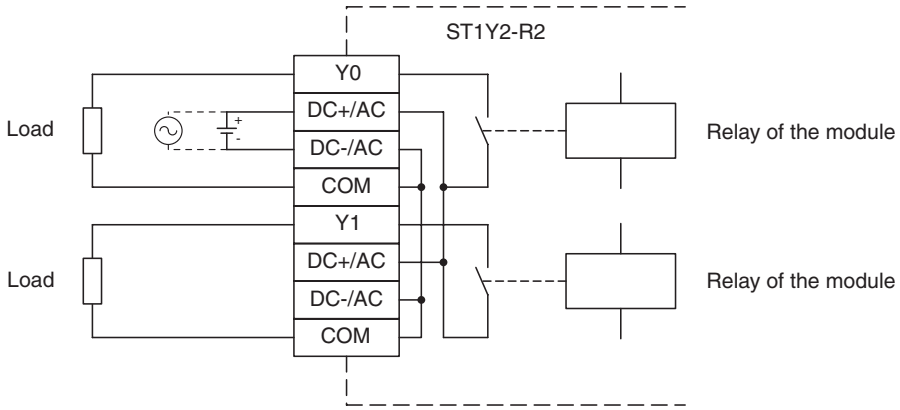
Digital Input Modules



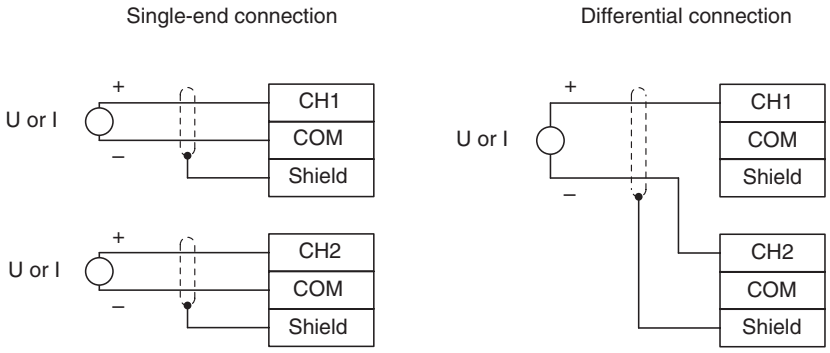
Transistor Output Modules (Source Type)



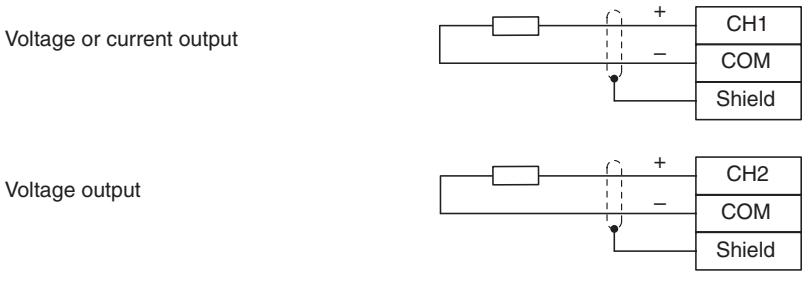
Contactor Output Module



Analog Input Modules

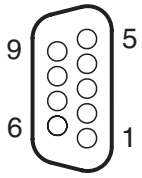


Analog Output Modules

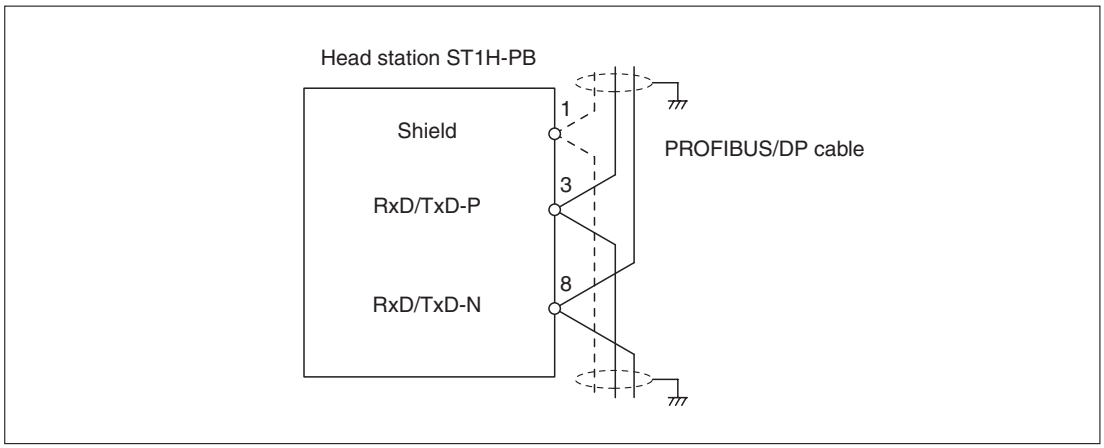


4.5 Connection of the PROFIBUS/DP Cable

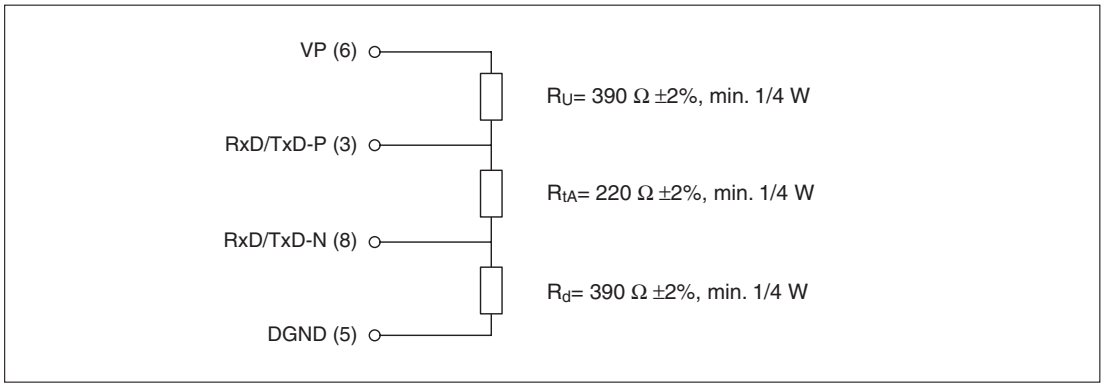
The shielded two-wire PROFIBUS/DP line is connected to the 9-pin D-SUB socket of the head station. The socket has the following pin assignment:

Pin Layout of the socket	PIN	Symbol	Name	Meaning
	1	—	SHIELD	Shield, protective earth
	2	—	M24V	Not used
	3	B/B′	RxD/TxD-P	Sent and received data (P)
	4	—	CNTR-P	Not used
	5	C/C′	DGND	Data Ground, Datenmasse
	6	—	VP	Voltage +
	7	—	P24V	Not used
	8	A/A′	RxD/TxD-N	Sent and received data (N)
	9	—	CNTR-N	Not used

To connect to the PROFIBUS use a 9-pin D-SUB plug like the PROFICON-PLUS plugs and PROFICON PLUS PG plugs from the MELSEC line of accessories. The two wires of the PROFIBUS line and the shielding are connected to pins 1, 3, and 8.



If the head module is the last station in a branch, then the PROFIBUS/DP line must be terminated with resistors. For the PROFICON-PLUS and PROFICON-PLUS PG plugs the resistances are already installed and can be switched on. For a plug without integrated resistors, three resistors must be connected according to the following circuit diagram. The resistors are not included in the module's scope of delivery.



4.6 Start-Up

Adhere to the following sequence for installation and start-up of a slave station comprised of MELSEC ST modules.

① Mount the DIN rail, and then mount the head station and the base modules on it (see pages 30and32).

② Connect the supply voltages and the input and output signals to the base modules (see page 36).

③ Mount the electronics module (see page 35).

④ Set the station numbers on the head module switches (see page 21).

⑤ Connect the head station to the PROFIBUS (see page 39).

⑥ Set the parameters of the head station as slave on the PROFIBUS using the GX Configurator DP software.

⑦ Use the GX Configurator DP software to set the parameters of the individual ST modules.

⑧ Set the parameters of the master station of the PROFIBUS/DP network.

⑨ Start the data transfer with the ST station via the PROFIBUS.

If all of the RUN LEDs are not illuminated, or if data transfer is not possible, then refer to the instructions for trouble shooting in the following chapter.

5 Trouble Shooting

If you cannot communicate with the head station via PROFIBUS, or if all RUN LEDs of the modules are not illuminated, or if an ERR LED is switched on, then there is an error. Detailed instructions for trouble shooting and error resolution are included in the manuals of the individual modules. The steps listed in this chapter are provided as a general guide for trouble shooting.

5.1 Checking the System Set-Up

When trouble shooting, first check the system set-up:

- Is the correct number of ST modules connected to a head station?
  A maximum of 63 modules (26 analog modules) can be connected to one head module. For those modules that exceed this range, the RUN LED remains switched off.
- Is the number of assigned I/O addresses within the permissible range?
  A maximum 256 I/O addresses can be assigned by one ST station. If the permissible number is exceeded, then the RUN LED does not light up on the modules that are outside of the range.
- Are electronic modules plugged onto all base modules?
  All electronics modules must be installed before switching on the supply voltage.
- Are the electronics modules mounted on the correct base module?
  There is an appropriate base module for each electronics module (see page 9). Check whether the correct combination is used.
- Is the system shorter than 85 cm?
  The total width of the ST Module connected to a head module may not exceed 85 cm (see page 9).
- Is the power consumption of the modules within the capacity of the power supply?
  It may be that the connected ST modules exceed the capacity of the internal 5 V supply. The capacity of the 24 V supply can be exceeded by the ST modules and connected devices. Instructions for calculating power consumption are included in the operating manual of the ST modules.

5.2 Head Station Self-Diagnostics

This self-diagnostics check only the head station:

① Switch-off the supply voltage of the ST station:

② Unplug the plug of the PROFIBUS/DP line from the head station.

③ Set the value “150” on the switches of the head station (see page).

④ Switch-off the supply voltage of the ST station: The self-diagnostics start automatically and the LEDs “RUN” and “DIA” start flashing.

⑤ After concluding the self diagnostics the LED “RUN” gives an indication of the result:

- If the “RUN” LED is illuminated: No error was determined. Reset the switch setting on the head station to the station number.
- If the “RUN” LED is not lit up: Execute the self-diagnostics again. If the “RUN” LED is still not illuminated, then there is a hardware error. Check the status of the LEDs “REL”, “DIA” and “BF” and contact the MITSUBISHI service.

5.3 Error Diagnostics using the LEDs

In chapter 3 there are additional instructions for ST module LEDs

Head station

- If the “RUN” LED of the head station is not lit up check whether
  - the correct station number has been set on the head station switches.
  - the LEDs “SYS” and “AUX” of all power distribution modules are illuminated.
  - a power distribution module is installed to the right of the head station.
  - the correct base module is used for the power distribution modules to the right of the head module. Pay attention to the modes “H” and “R”!
  - the capacity of the power supply is sufficient.
- If the “BF” LED of the head module is illuminated, check whether
  - the station number set on the switches is identical with the station number that is used in the slave parameters.
  - the set parameters correspond to the actual system set-up.
  - the master station works without problem.
  - the wiring of the PROFIBUS/DP network is error-free and terminating resistors are present.
- If the “ERR” LED of the head module is lit up, then an error code can be read out.

I/O modules

- If the “RUN” LED of an I/O module is not illuminated, then check whether the LEDs “RUN”, “SYS” and “AUX”, of the power distribution modules are illuminated.
- If only the “RUN” LED of an ST module flashes slowly, then replace the electronics module or base module.
- If the “RUN” LEDs of multiple ST modules, arranged directly next to each other, flash slowly, then replace the base module that is installed to the left of the malfunctioning modules. If afterwards the “RUN” LEDs continue to blink, then replace at the first malfunctioning module (to the left of the malfunctioning module) first the electronics modules and then the base module.
- If the “ERR” LED of an I/O module is illuminated, then replace this module.
- If the “ERR” LED flashes for the ST1Y2-TE2 and ST1Y16-TE2 output modules, then excess voltage or the excess temperature monitoring has tripped. Resolve the cause (for example a short circuit).

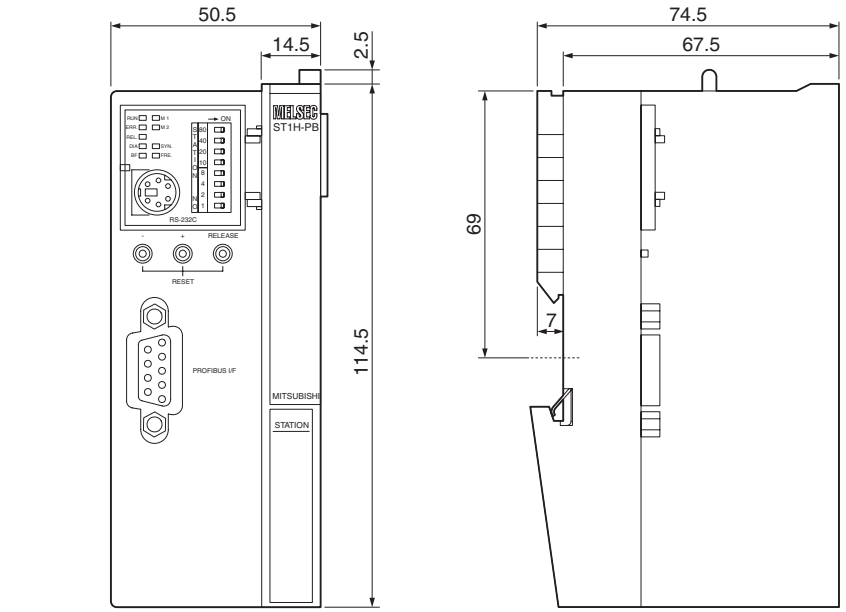
Power distribution modules and power feeding modules.

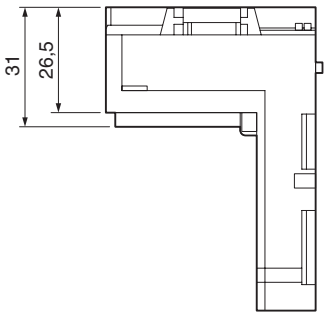
- If the “ERR” LED of an I/O module is illuminated, then replace this module.
- If the “ERR” LED flashes, and if the “SYS” LED is switched off at the same time, then the feed for the “SYS” voltage is too low.
- If the “ERR” LED flashes, and if the “AUX” LED is switched off at the same time, then the feed for the “AUX” voltage is too low.

A Appendix

A.1 External Dimensions of the Modules

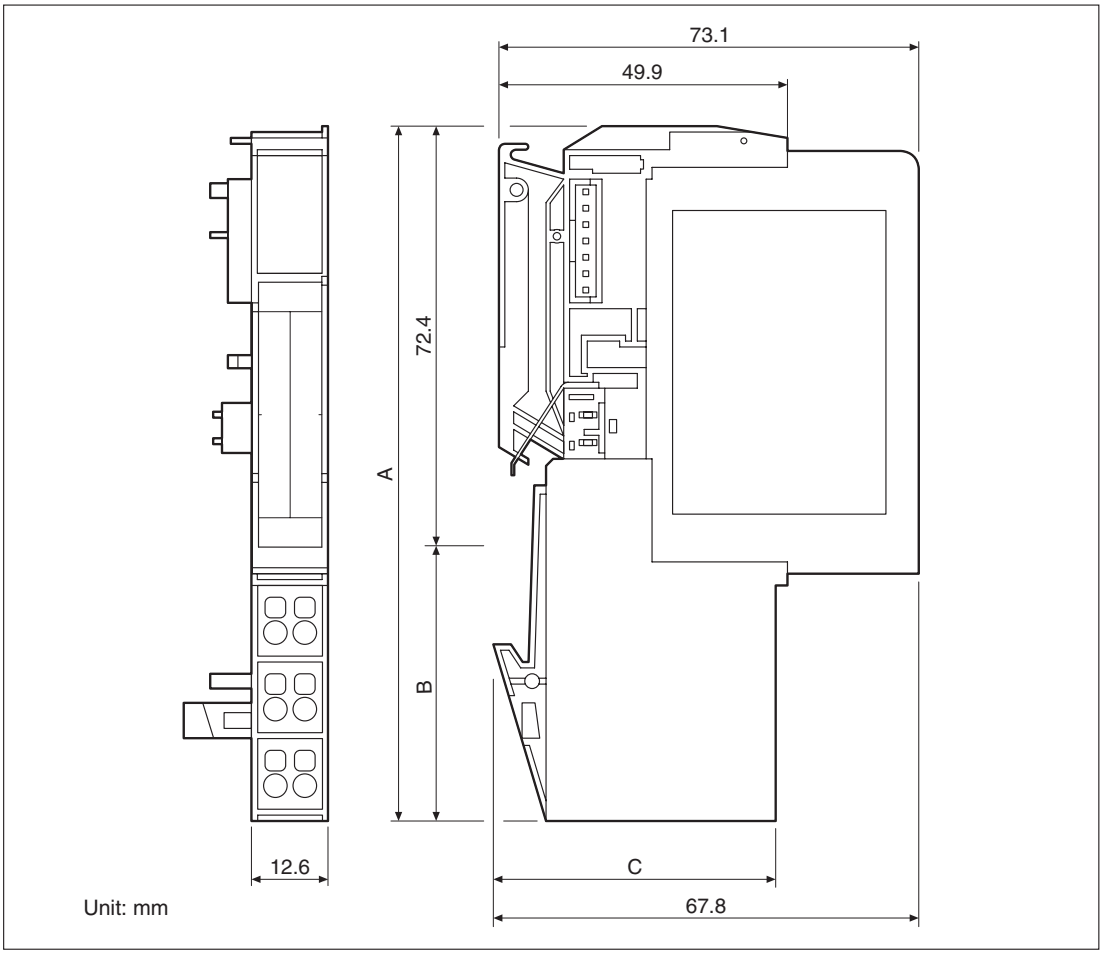
A.1.1 Head station ST1H-PB



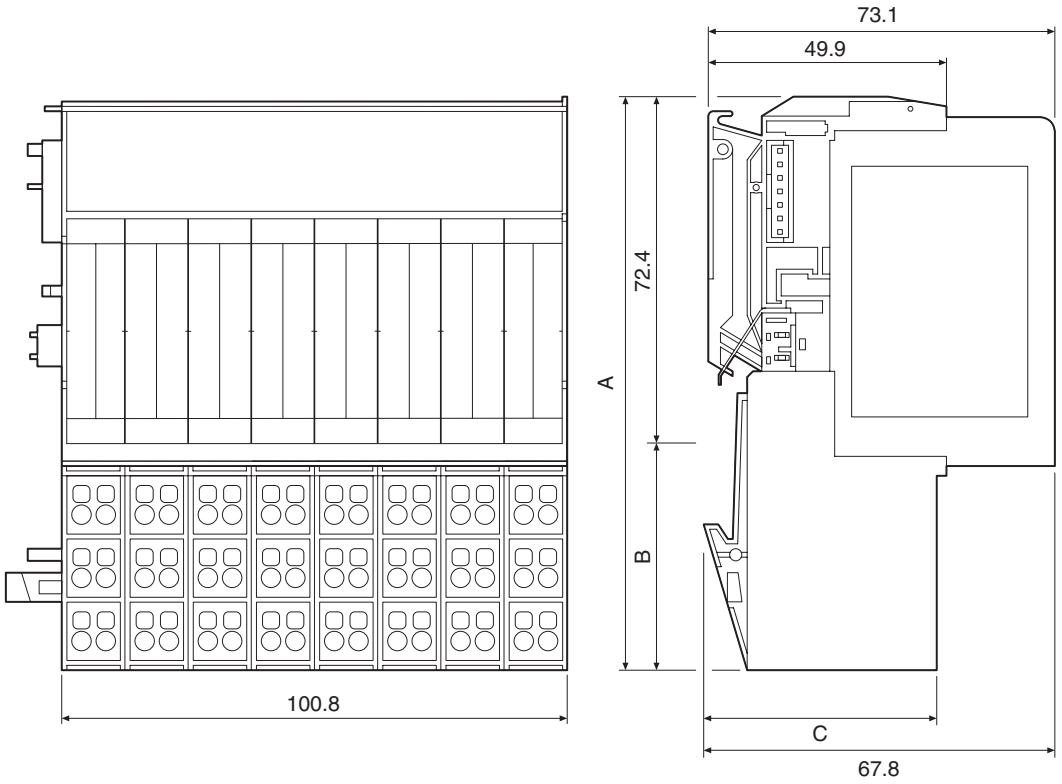


Alle dimensions are given in mm.

A.1.2 Base Modules



Base Modules		Dimensions (mm)		
		A	B	C
Screw clamp terminals	ST1B-E3Y2	117.6	45.2	48.3
	ST1B-E4X2	128.8	56.4	
	ST1B-E4IR2			
	ST1B-E4P2-H			
	ST1B-E4P2-R			
	ST1B-E4P2-D			
	ST1B-E6X4	154.4	82.0	
Spring clamp terminals	ST1B-S3Y2	117.6	45.2	41.6
	ST1B-S4X2	128.8	56.4	
	ST1B-S4IR2			
	ST1B-S4P2-H			
	ST1B-S4P2-R			
	ST1B-S4P2-D			
	ST1B-S6X4	154.4	82.0	

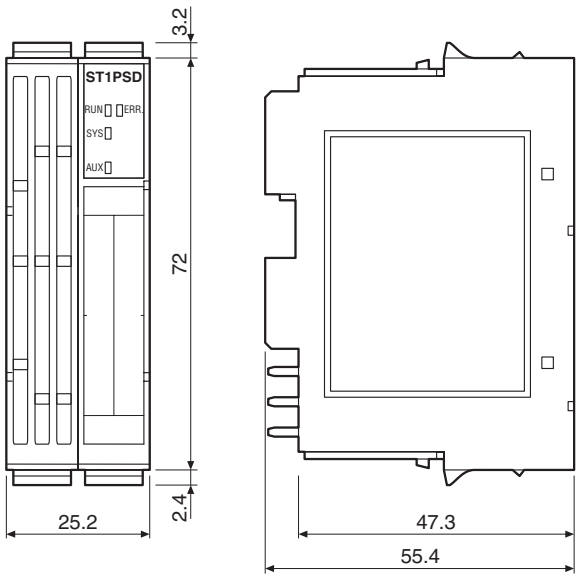


Unit: mm

Base Modules		Dimensions (mm)		
		A	B	C
Screw clamp terminals	ST1B-E3Y16	117.6	45.2	48.3
	ST1B-E4X16	128.8	56.4	
Spring clamp terminals	ST1B-S3Y16	117.6	45.2	41.6
	ST1B-S4X16	128.8	56.4	

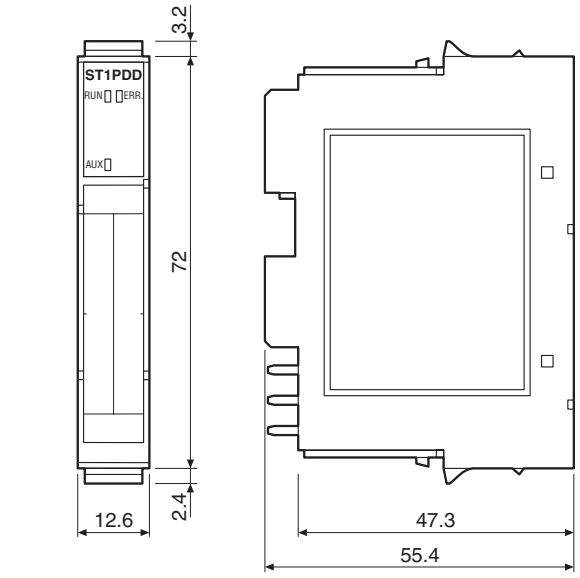
A.1.3 Power Distribution Modules

ST1PSD



Unit: mm

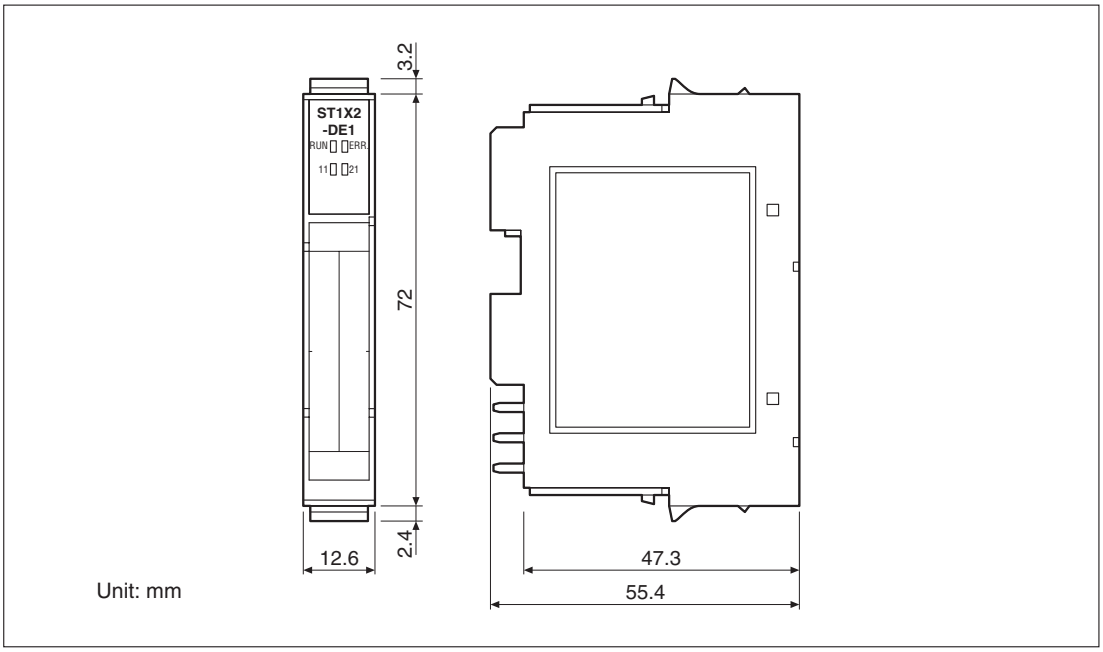
ST1PDD



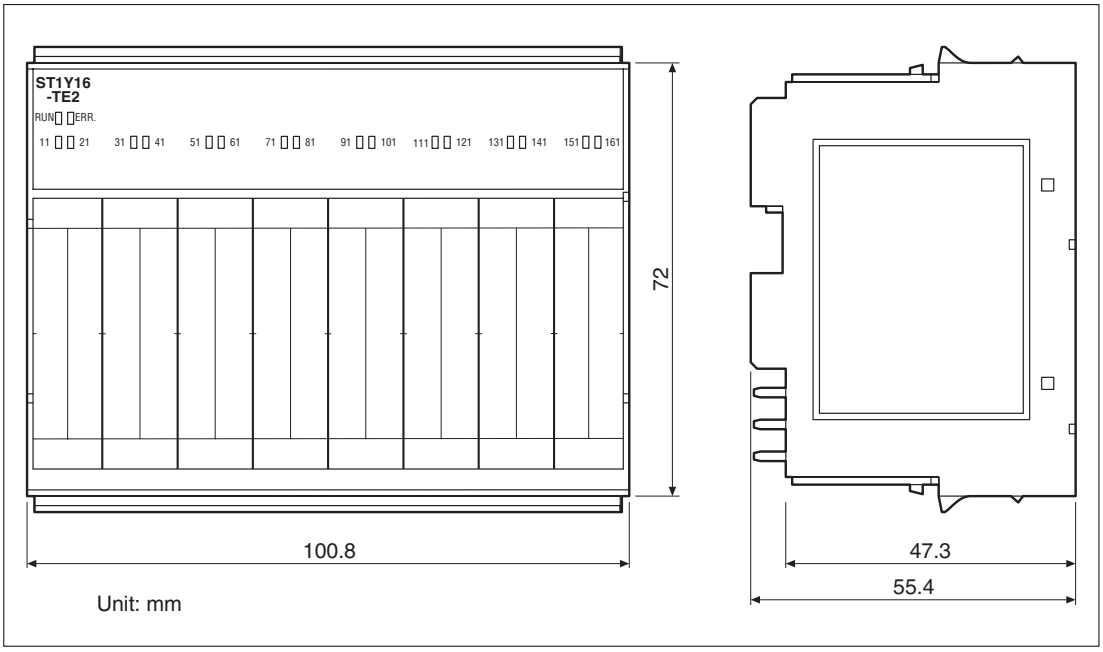
Unit: mm

A.1.4 I/O Modules

Modules with a wide of one slot (12.6 mm)



Modules with a wide of eight slots (100.8 mm)



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